

Exhibit 9

EXPERT REPORT OF DANIEL CICCARONE, MD, MPH

August 3, 2020

I. BACKGROUND AND QUALIFICATIONS

1. I am a Professor of Family Community Medicine at the University of California San Francisco (UCSF). I have been on faculty at UCSF since 2000. A copy of my current CV, which lists my publications in the last ten years, is attached to this Report as **Exhibit A**.

2. I received my undergraduate degree in biology and social sciences from State University of New York at Stony Brook in 1983 and my medical degree at SUNY Stony Brook in 1987. I completed my residency training in Family Medicine at UCSF (San Francisco General Hospital) in 1992. I received my Masters in Public Health (MPH) degree at University of California Berkeley (UCB) in 1998. I completed a second residency in General Preventive Medicine and Public Health at the UCSF/UCB Joint Residency Program in 2000, at the same time as completing a post-doctoral fellowship at the Center for AIDS Prevention Studies, UCSF.

3. I have been licensed to practice medicine in the State of California from 1992 to present. I have received board certification from the American Board of Medical Specialties in Family Medicine (American Board of Family Medicine, 1992 to present), Preventive Medicine (American Board of Preventive Medicine, 2003 to 2013) and Addiction Medicine (American Board of Preventive Medicine, sub-Board Addiction Medicine, 2018 to present).

4. My faculty/professional time is divided between research (at least 60% full-time equivalent), teaching (5-20%) and clinical (10-20%).

5. Over the past 20 years, I have been Principal Investigator or Co-Investigator on numerous US National Institutes of Health (NIH) sponsored research projects in the areas of public health and HIV/AIDS prevention. These population-based studies, utilizing both quantitative and qualitative methodologies, aim to deepen our understanding of HIV and related disease and risk-taking among socially marginalized groups, e.g., injection drug users.

6. I have published over 70 peer-reviewed articles, commentaries, letters and chapters in prestigious medicine, public health and addiction journals, including *New England Journal of Medicine*, *Journal of the American Medical Association*, *PLoS Medicine*, *American Journal of Public Health*, *International Journal on Drug Policy (IJD)*, and *Addiction*, among many others. According to Mendeley, my work has been cited over 3,000 times, viewed more than 60,000 times and mentioned in the media over 200 times.¹

7. For the past 15 years, my research has explored the differential medical consequences of use of various sources and forms of heroin. When the US recently entered a new heroin use epidemic, circa 2010, my team was already poised to explore it.² One of our first findings was how the heroin use epidemic was fueled by the recent opioid pill epidemic.³ My team is currently exploring the public health, economic, anthropological, and clinical dimensions of the “Triple Wave” – prescription opioid pills to heroin to fentanyl – opioid overdose crisis.⁴

8. My methodological innovation to public health research was the development of an *interdisciplinary* research platform combining quantitative and qualitative techniques to explore both the *breadth of structural risk* (quantitative methods including epidemiological and econometric) along with the *depth of personal risk taking* (qualitative methods including ethnographic and clinical observation) to better understand the problematic outcomes. Our

¹ <https://www.mendeley.com/impact/dan-ciccarone/>

² <https://www.researchgate.net/project/Heroin-Price-Purity-and-Outcomes-Study>

³ Mars S, Bourgois P, Karandinos G, Montero F, Ciccarone D. "Every 'Never' I Ever Said Came True": Transitions from opioid pills to heroin injecting. *Int J Drug Policy*. 2014 Mar;25(2):257-66. doi: 10.1016/j.drugpo.2013.10.004. Epub 2013 Oct 19. [PMID: 24238956]

⁴ <https://www.researchgate.net/project/Heroin-in-Transition>

methods have been highlighted in both the scientific⁵ and lay⁶ press. This interdisciplinary work gives us more complex understandings and insight into *mechanism* in the evolution of social problems. For example, in the triple wave opioid overdose phenomenon we can understand both supply (structural) and demand (personal, social) forces for drug use including the reasons for transitions from pills to heroin and fentanyl.

9. Doing street-based ethnographic research has an advantage of real time authentic observation. Fieldwork I did during 2011-2012 in inner-city Philadelphia led to a big-shift in the focus of my team's work.⁷ A key encounter at that time was with two older men who, while currently injecting heroin, started their opioid use as patients with workplace injuries and transitioned to heroin after developing opioid dependency and once their doctors "cut [them] off". We went on to document the early rise of the current US heroin epidemic and the influx of users migrating from opioid pill dependency to heroin. "*Every 'Never' I Ever Said Came True*": *Transitions from opioid pills to heroin injecting* is a qualitative exploration of opioid-pill-to-heroin transition stories; it is the first qualitative paper to compare the contexts of initiation into prescription opioid use and transitions to heroin injection across two generations of current heroin injectors in two distinct US cities.⁸ Key findings include folks initiating heroin after becoming

⁵ Ciccarone D. With Both Eyes Open: Notes on a Disciplinary Dialogue between Ethnographic and Epidemiological Research among Injection Drug Users. *Int J Drug Policy*. 2003; 14(1):115-8.

⁶ <https://medium.com/ucsf-magazine/streets-of-pain-bcf26aef318>

⁷ Fessel JN, Mars SG, Bourgois P and Ciccarone D. Into the Epistemic Void: Using rapid assessment to investigate the opioid crisis, in *Ethnography Uncensored*, ed. Miriam Boeri and Rashi K. Shukla. (2019) University of California Press.

⁸ Mars S, Bourgois P, Karandinos G, Montero F, Ciccarone D. "Every 'Never' I Ever Said Came True": Transitions from opioid pills to heroin injecting. *Int J Drug Policy*. 2014 Mar;25(2):257-66. doi: 10.1016/j.drugpo.2013.10.004. Epub 2013 Oct 19. [PMID: 24238956]

opioid pill dependent; while younger “pill-initiates” started with diverted opioid pills, most of our older pill-initiates started with prescribed opioids. (For more key findings see paragraph 50). This paper, led by my co-investigator Dr. Sarah Mars, has received several accolades: cited 234 times,⁹ it was for several years the most cited paper at IJDP since 2014; a “highly cited paper” according to Web of Science, it has received enough citations to place it in the top 1 percentile of papers in its field.¹⁰

10. Our first papers on this phenomenon received national attention all the way to the White House. The companion quantitative paper, *Intertwined Epidemics: National Demographic Trends in Hospitalizations for Heroin- and Opioid-Related Overdoses, 1993-2009*, presents a national statistical model on the intertwining epidemics of prescription opioid-related and heroin-related overdose.¹¹ This paper, led by my co-investigator Dr. Jay Unick, has been cited 173 times¹² and the language of “intertwined epidemics” used by many leaders including Michael Botticelli, former Director, Office of National Drug Control Policy. Its Altmetric score of 432 puts it in the top 1 percentile of all research outputs measured.¹³

11. I am currently Principal Investigator for the NIH/National Institute of Drug Abuse funded Heroin in Transition (HIT) study; a six-year project (2015-2021) with integrated

⁹ <https://badge.dimensions.ai/details/id/pub.1004504501>

¹⁰ http://apps.webofknowledge.com/summary.do?product=WOS&parentProduct=WOS&search_mode=GeneralSearch&parentQid=&qid=4&SID=5AjRg6yPuApGQAExUe2&&update_back2search_link_param=yes&page=3

¹¹ Unick GJ, Rosenblum D, Mars S, Ciccarone D. Intertwined epidemics: national demographic trends in hospitalizations for heroin- and opioid-related overdoses, 1993-2009. PLoS One. 2013; 8(2):e54496. PMID: 23405084

¹² <https://badge.dimensions.ai/details/id/pub.1040502066>

¹³ <https://www.altmetric.com/details/1225036>

multidisciplinary – ethnographic, economic and statistical modeling – aims to examine the recent rise in US heroin use and sharp increases in illicit opioid-involved morbidity and mortality. In 2017, I served as Guest Editor for a Special Issue of IJDP on *Heroin in Transition*.¹⁴

12. Recent published commentaries summarize our research insights. A key one, *The triple wave epidemic: Supply and demand drivers of the US opioid overdose crisis*, published in IJDP in 2019, summarizes the epidemiological data on three waves of opioid overdose deaths – opioid pills to heroin to fentanyl – along with an analysis of the structural and personal forces leading the transitions from wave to wave.¹⁵

13. The findings from HIT have been highly influential. HIT findings have received national and international attention through 17 peer-reviewed papers, letters and editorials as well

¹⁴ Ciccarone D. Fentanyl in the US heroin supply: A rapidly changing risk environment. *Int J Drug Policy*. 2017 08; 46:107-111. PMID: 28735776. PMCID: PMC5742018.

¹⁵ Ciccarone D. The triple wave epidemic: Supply and demand drivers of the US opioid overdose crisis. *Int J Drug Policy*. 2019 Feb 01. PMID: 30718120.

as two book chapters.¹⁶ HIT publications have received over 700 citations in just 6 years¹⁷; two of these papers are in the top 3 cited papers at IJDP since 2017.¹⁸ Intense media interest has led to

¹⁶ Mars S, Fessel J, Bourgois P, Montero F, Karandinos G, Ciccarone D. Heroin-related overdose: the unexplored influences of markets, marketing and source-types in the United States. *Soc Sci Med.* 2015 Sep;140:44-53. doi: 10.1016/j.socscimed.2015.06.032. Epub 2015 Jun 30. [PMID: 26202771]; Ciccarone D. & Harris M. Fire in the vein: Heroin acidity and its proximal effect on users' health. *Int J Drug Policy.* 2015 Nov;26(11):1103-10. doi: 10.1016/j.drugpo.2015.04.009. Epub 2015 Apr 17. [PMID: 26077143]; Ciccarone D & Bourgois P. Injecting drugs in tight spaces: HIV, cocaine and collinearity in the Downtown Eastside, Vancouver, BC. In IJDP Special Issue: Situating Drugs and Drug Use Geographically. *Int J Drug Policy.* 2016 Mar 8. pii: S0955-3959(16)30060-3. doi: 10.1016/j.drugpo.2016.02.028. [Epub ahead of print] PMID: 27117187; Ciccarone D, Unick J, Cohen J, Mars S, Rosenblum D. Nationwide increase in hospitalizations for heroin-related soft tissue infections: associations with structural market conditions. *Drug Alcohol Depend.* 2016 Apr 14. pii: S0376-8716(16)30036-9. doi: 10.1016/j.drugalcdep.2016.04.009. [Epub ahead of print] PMID: 27155756; Mars S, Bourgois P, Montero F, Karandinos G, Ciccarone D. The Textures of Heroin: User Perspectives on "Black Tar" and Powder Heroin in Two US Cities. *J of Psychoactive Drugs.* 2016 Sep-Oct;48(4):270-8. doi: 10.1080/02791072.2016.1207826. Epub 2016 Jul 20 PMID:27440088; Unick GJ, Ciccarone D. US regional and demographic differences in prescription opioid and heroin-related overdose hospitalizations. *Int J Drug Policy.* 2017 08; 46:112-119. PMID: 28688539. PMCID: PMC5722230; Ciccarone D, Ondocsin J, Mars SG. Heroin uncertainties: Exploring users' perceptions of fentanyl-adulterated and -substituted 'heroin'. *Int J Drug Policy.* 2017 08; 46:146-155. PMID: 28735775. PMCID: PMC5577861; Ciccarone D. Fentanyl in the US heroin supply: A rapidly changing risk environment. *Int J Drug Policy.* 2017 08; 46:107-111. PMID: 28735776. PMCID: PMC5742018; Mars SG, Ondocsin J, Ciccarone D. Sold as Heroin: Perceptions and Use of an Evolving Drug in Baltimore, MD. *J Psychoactive Drugs.* 2017 Dec 06; 1-10. PMID: 29211971. PMCID: PMC6114137; Dasgupta N, Beletsky L, Ciccarone D. Opioid Crisis: No Easy Fix to Its Social and Economic Determinants. *Am J Public Health.* 2018 Feb; 108(2):182-186. PMID: 29267060. PMCID: PMC5846593; Mars SG, Ondocsin J, Ciccarone D. Toots, tastes and tester shots: user accounts of drug sampling methods for gauging heroin potency. *Harm Reduct J.* 2018 May 16; 15(1):26. PMID: 29769132. PMCID: PMC5956544; Mars SG, Rosenblum D, Ciccarone D. 'Illicit fentanyls in the opioid street market: desired or imposed?' *Addiction.* 2018 Dec 4. doi: 10.1111/add.14474. [Epub ahead of print]; Ciccarone D. The triple wave epidemic: Supply and demand drivers of the US opioid overdose crisis. *Int J Drug Policy.* 2019 Feb 01. PMID: 30718120; Ciccarone D. Heroin Smoking Is Not Common in the United States. *JAMA Neurol.* 2019 Mar 11. PMID: 30855649; Mars SG, Rosenblum D, Ciccarone D. Fentanyl: the many challenges ahead. *Addiction.* 2019 Mar 15. PMID: 30873700. Bobashev G, Mars S, Murphy N, Dreisbach C, Zule W, Ciccarone D. Heroin type, injecting behavior, and HIV transmission. A simulation model of HIV incidence and prevalence. *PLoS One.* 2019; 14(12):e0215042. PMID: 31887142. PMCID: PMC6936826; Rosenblum D, Unick J, Ciccarone D. The Rapidly Changing US Illicit Drug Market and the Potential for an Improved Early Warning System: Evidence from Ohio Drug Crime Labs. *Drug Alcohol Depend.* 2020 Mar 01; 208:107779. PMID: 31931266. PMCID: PMC7096152; Fessel JN, Mars SG, Bourgois P and Ciccarone D. Into the Epistemic

over 200 news articles quoting myself as well as other HIT Co-Investigators, e.g., in *Science*, *Nature*, *The New York Times* (multiple), *The Washington Post* (multiple), *NBC*, *NPR*, among many others. Subsequently, 9 HIT papers have Altmetric scores in the 95th percentile and an additional 4 in the top 99th. Language from our HIT papers and presentations, e.g., “intertwined epidemics” and “triple wave epidemic” has made it into the national policy lexicon regarding the opioid crisis.

14. I have had the honor of giving numerous plenary and keynote presentations, on the triple wave opioid epidemic, in settings sponsored, e.g., by US Office of National Drug Control Policy (ONDCP), Centers for Disease Control and Prevention (CDC), US Drug Enforcement Administration (DEA), and the American Association for the Advancement of Science (AAAS), among others.

15. I have given testimony to the US House of Representatives twice, in 2018 and 2020, regarding the supply-side issues related to fentanyl, and other illicit synthetic opioids, and on public health responses to the triple wave crisis.

16. I have provided consultation to officials and agencies at local, state and federal levels, e.g., to the CDC, US Governmental Accountability Office, West Virginia’s State Health Office, New York State Health Department and Colorado Department of Public Health and Environment, among others. I was a temporary voting member of the Food and Drug

Void: Using rapid assessment to investigate the opioid crisis, in *Ethnography Uncensored*, ed. Miriam Boeri and Rashi K. Shukla. (2019) University of California Press.

¹⁷ https://app.dimensions.ai/discover/publication?or_facet_researcher=ur.015647654307.01&or_facet_researcher=ur.015715767507.22.

¹⁸ <https://www.journals.elsevier.com/international-journal-of-drug-policy/most-cited-articles>.

Administration (FDA) Center for Drug Evaluation and Research's Drug Safety and Risk Management Advisory Committee (DSaRM) in 2017-18.

17. Last year I was honored for my contributions to the drugs field and underserved populations with the 2019 UCSF Chancellor's Award for Public Service.

18. I have been an Associate Editor at IJDP since 2013, with the subject domain of drug policy and economics; and ranked an “outstanding reviewer” at that journal in 2015 and 2018. I have peer-reviewed almost 100 manuscripts in over 30 academic journals.

19. In my activities as a medical educator at UCSF, I have largely worked towards improving the social, behavioral and prevention science content within the medical school curriculum. From 2009 to 2016, I was Co-Director for the Foundations of Patient Care (FPC) course. This course helped students develop their clinical and professional skills. I was also Director of the Transitional Clerkship (2009-2017), a two-week immersion course for second year medical students transitioning to their clinical training years.

20. In the realm of addiction medicine, I have several educational accomplishments. I developed an elective course for advanced students regarding substance use, entitled *Understanding the Complexities of Substance Use “in The Real World.”* The course has been described in a brief publication in *Medical Education.*¹⁹ I have given an annual lecture on homelessness, injection drug use and infection. This won an “outstanding lecture” award from the student body in 2009.

¹⁹ Ciccarone D, Jain S, Bourgois P. Understanding illicit substance use in the real world. *Med Educ.* 2008 May; 42(5):532. PMID: 18412911.

21. From 2009 to 2015, I was part of a team led by Dr. Paula Lum to develop and implement a 7-week seminar series to introduce SBIRT (Screening, Brief Intervention and Referral to Treatment) skills to Internal Medicine residents. This has been described in two publications.²⁰

22. Beginning in 2018 and continuing to the present, I have focused my teaching efforts exclusively on curriculum development and advising related to addiction medicine. In 2018, the six University of California (UC) medical schools appointed an Opioid Crisis Workgroup to develop educational strategies and a coordinated response to the opioid epidemic. I am a key participant in that Workgroup helping develop competencies and curricula for student education in pain management, appropriate opioid prescribing, and substance use disorders screening and treatment. I am supervising or mentoring several students and post-docs in their addiction related educational or research efforts. In addition, I am faculty advisor for the student run harm reduction and addiction medicine student interest group (and their fall teaching elective) and am affiliated faculty for the UCSF Primary Care Addiction Medicine Fellowship. In 2019, I lectured in the UCSF Mini-Medical School (for the public) on addiction.

23. I have received several awards while at UCSF, including for teaching (2006 and 2009) and have been nominated for dozens more.

²⁰ Hettema JE, Ratanawongsa N, Manuel JK, Ciccarone D, Coffa D, Jain S, Lum PJ. A SBIRT curriculum for medical residents: development of a performance feedback tool to build learner confidence. *Subst Abus.* 2012; 33(3):241-50. PMID: 22738001. Azari S, Lum P, Ratanawongsa N, Ciccarone D, Cangelosi C, Coffa D, Shapiro B, Jain S, Hersh D, Hettema J, Manuel J. A Skills-Based Curriculum for Teaching Motivational Interviewing-Enhanced Screening, Brief Intervention, and Referral to Treatment (SBIRT) to Medical Residents. MedEdPORTAL Publications; 2015. Available at <https://www.mededportal.org/publication/10080>; http://dx.doi.org/10.15766/mep_2374-8265.10080

24. Since 2019, I have served on the Pain and Addiction Research Center (PARC) Strategic Advisory Board. The goal of PARC is to create an interactive community at UCSF to promote discovery and translation of clinical and preclinical research results to improve patient care in the related fields of pain and addiction medicine.

25. My clinical activities consist of providing patient care for 10-20% of my professional time. The clinic I work in provides treatment for substance use disorders and chronic pain. I treat patients suffering with alcohol, benzodiazepine and opioid use disorders. In 2017, I received my DATA 2000 waiver to prescribe buprenorphine for the treatment of opioid use disorder.

26. I am a member of the following organizations: International Society for the Study of Drug Policy, the Association for Medical Education and Research in Substance Abuse (AMERSA), the California Society of Addiction Medicine, and the American Society of Addiction Medicine.

II. SUMMARY OF OPINIONS

27. In my opinion, there is a well-defined causal link between the use of prescription opioids and subsequent use of heroin.

28. The increased availability of prescription opioids has resulted in increased number of heroin users, transitioning from opioid pill misuse to heroin use, particularly among the 20 to 34-year-old age group.

29. A second wave of heroin-related overdose built upon, and is intertwined with, the first wave of opioid-pill-related overdose. Heroin-related deaths have increased 394% nationally

from 2008 to 2018.²¹ The third wave, overdoses due to fentanyl-adulterated or -substituted heroin (FASH), has dramatically compounded the overdose problem.

30. The State of West Virginia has been disproportionately affected by the triple wave overdose phenomenon. West Virginia has experienced statistically significant increases in drug overdose deaths every year since 2013 with an age-adjusted death rate of 57.8 per 100,000 in 2017.²² This is the highest drug related death rate for any state in the US.²³ These increases have occurred across multiple opioid categories, including heroin, synthetic and prescription opioids.²⁴ The death rate attributed to prescription opioids remains high in West Virginia (19.7 per 100,000 in 2016)²⁵ with a slight decline in 2017 (17.2 per 100,000),²⁶ the highest rate among US states for both years. Within West Virginia, Cabell County has been disproportionately affected, ranking

²¹ Hedegaard H, Miniño AM, Warner M. Drug overdose deaths in the United States, 1999–2018. NCHS Data Brief, no 356. Hyattsville, MD: National Center for Health Statistics. 2020.

²² Scholl L, Seth P, Kariisa M, Wilson N, Baldwin G. Drug and Opioid-Involved Overdose Deaths — United States, 2013–2017. MMWR Morb Mortal Wkly Rep. 2019 Jan 4;67(5152):1419–27.

²³ Scholl L, Seth P, Kariisa M, Wilson N, Baldwin G. Drug and Opioid-Involved Overdose Deaths — United States, 2013–2017. MMWR Morb Mortal Wkly Rep. 2019 Jan 4;67(5152):1419–27.

²⁴ Seth P, Scholl L, Rudd RA, Bacon S. Overdose Deaths Involving Opioids, Cocaine, and Psychostimulants — United States, 2015–2016. MMWR Morb Mortal Wkly Rep. 2018 Mar 30;67(12):349–58.

²⁵ Seth P, Scholl L, Rudd RA, Bacon S. Overdose Deaths Involving Opioids, Cocaine, and Psychostimulants — United States, 2015–2016. MMWR Morb Mortal Wkly Rep. 2018 Mar 30;67(12):349–58.

²⁶ Scholl L, Seth P, Kariisa M, Wilson N, Baldwin G. Drug and Opioid-Involved Overdose Deaths — United States, 2013–2017. MMWR Morb Mortal Wkly Rep. 2019 Jan 4;67(5152):1419–27.

first in the state with the highest opioid overdose death rate per 100,000 population for 2015 and 2016.²⁷

III. METHODOLOGY

31. My report is based on my twenty years of experience as a professor of family and community medicine at UCSF, the evidence gathered through my public health research on substance use and, in particular, my recent research into the link between prescription opioid use and subsequent heroin use.

32. My opinion is also informed by my 30 years of training and experience as a clinician, both as a family medicine practitioner and more recently as an addiction medicine specialist, providing care for persons affected by substance use.

33. As part of my research, I have received three grants, over 15 years of continuous funding, from the National Institutes of Health, National Institute on Drug Abuse, to study the public health aspects of heroin use. I am the Principal Investigator on each of these and as such I lead a team of researchers (co-investigators) and staff. The questions we pose, the analyses we perform and the papers we write are all chosen and approved by me; the work is collaborative.²⁸ Our research is multi-methodological. For our epidemiological research we perform extensive literature searches, gather data from governmental sources, analyze it using sophisticated means and publish it following community standards of peer-review. Our qualitative research is laborious

²⁷ West Virginia Board of Pharmacy. Prescription Opioid Problematic Prescribing Indicators County Report, Cabell County. October 2017. https://helpandhopewv.org/docs/PFS_County_Reports/Cabell_PfS%20County%20Reports_Final.pdf.

²⁸ In publications, the role of Principal Investigator is usually denoted with first- or last- (i.e., “senior”) authorship positions.

and involves the logistics of fieldwork in multiple US locations, interviewing dozens of research subjects (i.e., opioid and heroin users), along with multiple days of observations and hours of video and audio recordings per location; followed by rigorous analysis, write-up and publication. My research has resulted in the publication of over 40 peer-reviewed articles on heroin with several key publications on the link between prescription opioids and heroin:

- Unick GJ, Rosenblum D, Mars S, Ciccarone D. Intertwined epidemics: national demographic trends in hospitalizations for heroin- and opioid-related overdoses, 1993-2009. *PLoS One*. 2013; 8(2):e54496. PMID: 23405084.
- Mars S, Bourgois P, Karandinos G, Montero F, Ciccarone D. “Every ‘Never’ I Ever Said Came True”: Transitions from opioid pills to heroin injecting. *International Journal of Drug Policy*. 2014 Mar;25(2):257-66. PMID: 24238956.
- Unick GJ, Ciccarone D. US regional and demographic differences in prescription opioid and heroin-related overdose hospitalizations. *Int J Drug Policy*. 2017 08; 46:112-119. PMID: 28688539. PMCID: PMC5722230.
- Dasgupta N, Beletsky L, Ciccarone D. Opioid Crisis: No Easy Fix to Its Social and Economic Determinants. *Am J Public Health*. 2018 Feb; 108(2):182-186. PMID: 29267060. PMCID: PMC5846593.
- Ciccarone D. The triple wave epidemic: Supply and demand drivers of the US opioid overdose crisis. *Int J Drug Policy*. 2019 Feb 01. PMID: 30718120.

34. In preparing this report I reviewed documents provided to me by the Plaintiffs, including expert opinion reports from Drs. Lembke, Alexander, and Courtwright, state data reports from West Virginia, published literature and my own published papers. Specifically for this report,

in addition to the materials referenced in the footnotes, I have considered the materials listed in **Exhibit B**, attached. I hold the opinions stated in this report to a reasonable degree of scientific certainty based on the information I had at the time of writing it. Opinions are my own and not that of the University of California. I reserve the right to revise my perspectives as new data are presented to me.

35. My opinions have also been honed by my experience in the scholarship of drug policy. In my role as Associate Editor for the *International Journal of Drug Policy*, the premier drug policy journal, I read, process and publish dozens of scholarly articles each year. My research and expertise also has me interfacing with government, public policy and intervention leaders at the national, state and local levels; and in these interactions my opinions get honed.

36. My hourly rate of compensation for this work is \$500 for all services, except for deposition and trial testimony, which shall be \$600. I am not compensated based on the outcome of this matter.

IV. DISCUSSION OF OPINIONS

A. Opioid Use Disorder

37. Addiction has been defined by several leading organizations. The American Society of Addiction Medicine's definition: "Addiction is a primary, chronic disease of brain reward, motivation, memory and related circuitry. Dysfunction in these circuits leads to characteristic biological, psychological, social and spiritual manifestations. This is reflected in an individual pathologically pursuing reward and/or relief by substance use and other behaviors. Addiction is characterized by inability to consistently abstain, impairment in behavioral control, craving, diminished recognition of significant problems with one's behaviors and interpersonal relationships, and a dysfunctional emotional response. Like other chronic diseases, addiction often involves cycles of relapse and remission. Without treatment or engagement in recovery activities,

addiction is progressive and can result in disability or premature death.”²⁹ The important element in this definition is that addiction is the manifestation of a brain disease. That is it is an organ disease similar to diabetes being a metabolic disease, or myocardial infarction being a disease of the heart. The disease of addiction is considered a maladaptive, or pathophysiological, response to chronic exposure to an addicting substance. The “characteristic biological, psychological, etc. manifestations” say more about the hurt brain than do the typical causal attributions of “choice,” or “morals” of the individual. In Dr. Lembke’s expert opinion she states, that while “everyone is vulnerable to the disease of addiction... without activation by consumption of the drug, the disease of addiction does not exist. Exposure to/consumption of the addictive substance is a necessary criterion for the development of addiction to that substance.”³⁰ I agree with this statement and have seen it occur in my clinical practice as well as in my research experience. Exposure to opioids is the critical first step in developing OUD. Chronic exposure can then lead to altered brain functioning. The behavioral features of addiction, e.g., craving for the drug, compulsive drug taking, etc. are associated with structural and functional changes in the neural, e.g., reward, circuits of the brain.³¹

38. Clinical providers need diagnostic criteria for establishing a medical condition in a patient. The current diagnostic nomenclature for “addictions” is “substance use disorders.” The

²⁹ American Society of Addiction Medicine (ASAM) Definition of Addiction: <https://www.asam.org/resources/definition-of-addiction> (accessed June 17, 2020).

³⁰ Expert Report of Anna Lembke, M.D., *Cabell County Commission and City of Huntington, West Virginia v. AmerisourceBergen Drug Corp., et al.*, No. 1:17-op-45053-SAP and No. 1:17-op-45054.

³¹ Volkow ND, McLellan AT. Opioid Abuse in Chronic Pain - Misconceptions and Mitigation Strategies. *N Engl J Med.* 2016;374(13):1253-1263. doi:10.1056/NEJMra1507771.

Diagnostic and Statistical Manual of Mental Disorders (DSM-5)³² is the textbook that clinicians use to diagnose mental health, including substance use disorders, in their patients. The DSM-5 states 11 different symptomatic criteria to diagnose an opioid use disorder (OUD). It is a spectrum disorder; severity of OUD depend on the number of criteria/symptoms met: mild OUD, 2-3 symptoms; moderate, 4-5 symptoms; severe, 6 or more symptoms. In my opinion, DSM-5 went too far in removing tolerance and withdrawal as symptoms of OUD.

39. Risks leading to OUD include genetic predisposition (including family history), developmental conditions, and environmental influences. The complexity of these interacting forces has not been fully elucidated. Some persons are more vulnerable than others and this also not completely understood. One force that is quite clear – in raising the whole societal boat of vulnerability – is the role of increased supply and exposure to opioids.

40. OUD manifests from a disorder in the brain's dopaminergic centers. Dopamine is our “reward” neurochemical that regulates how we perceive pleasure and pain.³³ Opioids, including natural ones (e.g., morphine), semi synthetics (e.g., oxycodone or heroin), or full synthetics (e.g., fentanyl), cause increases in dopamine release. Physiological processes in the body work hard to achieve homeostatic balance. Neuroadaptation is the mechanism in which the brain achieves homeostasis. If dopamine is externally triggered, a natural response in the reward center is to reduce internal dopamine availability and function. This is the underlying mechanism of withdrawal from, tolerance to and dependency on opioids. The resulting dopamine deficit state

³² Diagnostic and Statistical Manual of Mental Disorders. Washington, DC: American Psychiatric Association (DSM-5); 2013.

³³ Koob GF, Volkow ND. Neurocircuitry of addiction. *Neuropsychopharmacology*. 2010;35:217-238. doi:10.1038/npp.2010.4

causes the threshold for experiencing pleasure to go up, while the threshold for experiencing pain goes down. Persons who are chronically exposed (and this happens in short course) *need* further opioids in order to achieve pain relief (usually in higher doses to overcome tolerance) and to avoid withdrawal – in short, to feel well. Over a longer period of exposure maladaptive symptoms may develop including, e.g., psychological (e.g., craving) or social symptoms (e.g., inability to meet work duties); if enough of the 11 DSM-5 symptoms develop then criteria for OUD is met. (See paragraph 38 above.)

41. Drug supply matters in terms of causing waves of problematic drug use.³⁴ Historians have observed the implications of increased supply in several opioid misuse cycles beginning with morphine in the latter half of the 19th century.³⁵ Morphine was mostly dispensed by physicians in the United States, particularly to women.³⁶ The United States' first opioid problem was iatrogenic, i.e., caused by prescribers and pharmacists, and exacerbated by the technological advance of the hypodermic syringe.³⁷ According to historian David Courtwright, “the two most important risk factors (for morphine addiction) were exposure to narcotics and a history of chronic

³⁴ Ciccarone D. The triple wave epidemic: Supply and demand drivers of the US opioid overdose crisis. *Int J Drug Policy*. 2019 Feb 01. PMID: 30718120.

³⁵ Courtwright, D. T. (2001a). *Forces of habit. Drugs and the making of the modern world*. Cambridge, MA and London, UK: Harvard University Press. Courtwright, D. T. (2001b). *Dark paradise: A history of opiate addiction in America*. Cambridge, MA: Harvard University Press. Musto, D. F. (1999). *The American disease: Origins of narcotic control* (3rd ed.). New York: Oxford University Press.

³⁶ Courtwright, D. T. (2001a). *Forces of habit. Drugs and the making of the modern world*. Cambridge, MA and London, UK: Harvard University Press.

³⁷ Courtwright, D. T. (2001b). *Dark paradise: A history of opiate addiction in America*. Cambridge, MA: Harvard University Press.

illness.”³⁸ At the peak of this first US opioid epidemic in 1895, approximately 300,000 persons suffered from addiction to opioids, a population prevalence of 0.4%, or 1 in every 250 persons.³⁹

42. Subsequently, periods of increased licit and illicit opioid supplies influenced use and misuse and caused waves of public health problems. Heroin (diacetylmorphine) had a short life as a licit medication beginning in 1898. Medical conservatism regarding opiates, stemming from lessons learned from morphine addiction, kept iatrogenic addiction to heroin to a lesser wave than that which preceded it. Nevertheless, heroin became a problematic drug and was banned from medical practice. Likewise concerns about problematic use following the introduction of oxycodone (semisynthetic opioid) and methadone (synthetic opioid) in the 1940s led to their regulation.⁴⁰ Illicit heroin had waves of use and consequence following the introduction of new sources and increased supplies in the 1940s and 1970s.⁴¹

43. Increased access to opioids increases incident opioid use disorder. The biggest risk for developing OUD is exposure.⁴² A 1954 study reported that 17% of opioid addicted men

³⁸ Courtwright, D. T. (2001b). *Dark paradise: A history of opiate addiction in America*. Cambridge, MA: Harvard University Press.

³⁹ My calculation is based on opiate “addict” population estimate from Courtwright, Dark Paradise, and US historic census data obtained from: <https://www.census.gov/population/estimates/nation/popclockest.txt> (accessed June 17, 2020).

⁴⁰ Edlund MJ, Martin BC, Russo JE, Devries A, Braden JB, Sullivan MD. The Role of Opioid Prescription in Incident Opioid Abuse and Dependence Among Individuals With Chronic Noncancer Pain. *Clin J Pain*. 2014;30(7):557-564.

⁴¹ Ciccarone D. The triple wave epidemic: Supply and demand drivers of the US opioid overdose crisis. *Int J Drug Policy*. 2019 Feb 01. PMID: 30718120.

⁴² Expert Report of Anna Lembke, M.D., *Cabell County Commission and City of Huntington, West Virginia v. AmerisourceBergen Drug Corp., et al.*, No. 1:17-op-45053-SAP and No. 1:17-op-45054.

became addicted after being treated with opioids for pain.⁴³ Increased dose and duration of opioid use is directly correlated with risk of addiction. The odds ratio⁴⁴ (risk) of developing OUD in patients on chronic opioid therapy compared to those not prescribed opioids ranges from 15 (low daily morphine equivalent dose) to 122 (high daily morphine equivalent dose).⁴⁵ These odds ratios, from Edlund et al, for patients developing incident OUD following chronic exposure to opioids, far exceed those from other known risk factors of mental health and prior substance use disorder history.⁴⁶ A pooled estimate of the risk of addiction with chronic opioid therapy comes from a systematic review by Vowles et al.⁴⁷ Following chronic opioid therapy in the populations studied, rates of opioid misuse averaged between 21% and 29% (range, 95% confidence interval [CI]: 13%-38%), and rates of opioid addiction averaged between 8% and 12% (range, 95% CI: 3%-17%).

⁴³ Rayport M. Experience in the Management of Patients Medically Addicted to Narcotics. JAMA - J Am Med Assoc. 1954;156(7):684-691, at p. 690.

⁴⁴ An “odds ratio” compares the odds of an outcome happening given exposure, with that without exposure. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2938757/>.

⁴⁵ Edlund MJ, Martin BC, Russo JE, Devries A, Braden JB, Sullivan MD. The Role of Opioid Prescription in Incident Opioid Abuse and Dependence Among Individuals With Chronic Noncancer Pain. Clin J Pain. 2014;30(7):557-564.

⁴⁶ Edlund MJ, Martin BC, Russo JE, Devries A, Braden JB, Sullivan MD. The Role of Opioid Prescription in Incident Opioid Abuse and Dependence Among Individuals With Chronic Noncancer Pain. Clin J Pain. 2014;30(7):557-564.

⁴⁷ Vowles KE, McEntee ML, Julnes PS, Frohe T, Ney JP, Van Der Goes DN. Rates of opioid misuse, abuse, and addiction in chronic pain: A systematic review and data synthesis. Pain. 2015.

- a. The US is the leading global consumer of prescription opioids: 30 percent of the global total; at a rate of 47,580 doses per day per million people.⁴⁸ The supply of prescription opioids was clearly excessive with the equivalent to 710 mg per person in the United States in 2010.⁴⁹ Opioid oversupply has been a key driver in the opioid epidemic according to reports from the CDC⁵⁰ and the National Academies of Science, Engineering and Medicine (NASEM).⁵¹
- b. The tremendous expansion of prescription opioid sales in the 2000s and 2010s led to parallel increases in treatment seeking for OUD and overdose deaths. From 1999 to 2010, sales of prescription opioids increased by a factor of four; treatment seeking for OUD was almost six times the rate in 1999; and the overdose death rate in 2008 was nearly four times the rate in 1999.⁵²

⁴⁸ International Narcotics Control Board, Narcotic Drugs Technical Report 2016, at pp. 200-203. See <https://www.incb.org/incb/en/narcotic-drugs/Technical%20Reports/2016/narcotic-drugs-technical-report-2016.html>.

⁴⁹ Paulozzi LJ, Jones CM, Mack K a, Rudd R a. Vital Signs: Overdoses of Prescription Opioid Pain Relievers --- {United States}, 1999–2008. MMWR Morb Mortal Wkly Rep. 2011;60(43):1487-1492, http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6043a4.htm?s_cid=mm6043a4_w, at p. 1489.

⁵⁰ Centers for Disease Control and Prevention. Contextual evidence review for the CDC guideline for prescribing opioids for chronic pain – United States, 2016. CDC Stacks: Public Health Publications. March 18, 2016. <https://stacks.cdc.gov/view/cdc/38027> (accessed June 18, 2020).

⁵¹ National Academies of Science Engineering and Medicine. Pain Management and the Opioid Epidemic: Balancing Societal and Individual Benefits and Risks of Prescription Opioid Use; 2017. doi:10.17226/24781.

⁵² Paulozzi LJ, Jones CM, Mack K a, Rudd R a. Vital Signs: Overdoses of Prescription Opioid Pain Relievers --- {United States}, 1999–2008. MMWR Morb Mortal Wkly Rep. 2011;60(43):1487-1492, http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6043a4.htm?s_cid=mm6043a4_w, at p. 1489.

c. Between 1999 and 2018, nearly a quarter million (246,444) Americans have died from overdose related to prescription opioids (not including non-methadone synthetic opioids, e.g., fentanyl). The overdose death rate from natural and semi-synthetic opioids has increased four-fold from 1.0/100,000 (1999) to 4.4/100,000 (2017); with a decline to 3.8/100k in 2018.⁵³

44. Among the national crisis of drug overdose deaths, the death rate in the State of West Virginia stands above all other states. In 2008, West Virginia had the second highest all-drug overdose death rate in the country at 25.8/100,000.⁵⁴ At the same time the state was ranked seventh highest in rate of prescription opioid misuse. By 2015, West Virginia had the highest *opioid* overdose death rate at 41.5 deaths per every 100,000 people;⁵⁵ far ahead of the next states in the ranking: New Hampshire (34.3 per 100,000), Kentucky (29.9 per 100,000), Ohio (29.9 per 100,000), and Rhode Island (28.2 per 100,000).⁵⁶ And the situation got worse. West Virginia has experienced statistically significant increases in drug overdose deaths every year since 2013 with

⁵³ Hedegaard H, Miniño AM, Warner M. Drug overdose deaths in the United States, 1999–2018. NCHS Data Brief, no 356. Hyattsville, MD: National Center for Health Statistics. 2020.

⁵⁴ Paulozzi LJ, Jones CM, Mack KA, Rudd RA. Vital Signs: Overdoses of Prescription Opioid Pain Relievers --- {United States}, 1999–2008. MMWR Morb Mortal Wkly Rep. 2011;60(43):1487-1492, http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6043a4.htm?s_cid=mm6043a4_w

⁵⁵ Rudd RA, Seth P, David F, & Scholl L. (2015). Increases in Drug and Opioid-Involved Overdose Deaths — United States, 2010–2015. MMWR Morbidity and Mortal Weekly Report. 65:1445–1452. Retrieved Jan 20, 2017 from <http://dx.doi.org/10.15585/mmwr.mm655051e1>.

⁵⁶ Centers for Disease Control and Prevention (CDC). (2016b). Drug Overdose Death Data, <https://www.cdc.gov/drugoverdose/data/statedeaths.html> (accessed June 18, 2020).

an age-adjusted death rate of 57.8 per 100,000 in 2017.⁵⁷ Prescription opioid deaths remain high (19.7 per 100,000 in 2016⁵⁸) with a slight decline in 2017 (17.2 per 100,000⁵⁹), the highest in the US for both years.

- a. Other than Berkeley County in West Virginia's eastern panhandle, overdose deaths are concentrated in the southern portion of the state and along the Ohio border, including the counties of Kanawha (home to Charleston, the state capitol) and Cabell (county seat of Huntington).⁶⁰ Cabell County had an opioid overdose death rate of 72.7 per 100,000 in 2017, almost five times the national average.⁶¹
- b. Research and reporting from *HD Media* and *The Washington Post* reveal the extreme excess distribution of prescription opioids into West Virginia.⁶² Between

⁵⁷ Scholl L, Seth P, Kariisa M, Wilson N, Baldwin G. Drug and Opioid-Involved Overdose Deaths — United States, 2013–2017. *MMWR Morb Mortal Wkly Rep.* 2019 Jan 4;67(5152):1419–27.

⁵⁸ Seth P, Scholl L, Rudd RA, Bacon S. Overdose Deaths Involving Opioids, Cocaine, and Psychostimulants — United States, 2015–2016. *MMWR Morb Mortal Wkly Rep.* 2018 Mar 30;67(12):349–58.

⁵⁹ Scholl L, Seth P, Kariisa M, Wilson N, Baldwin G. Drug and Opioid-Involved Overdose Deaths — United States, 2013–2017. *MMWR Morb Mortal Wkly Rep.* 2019 Jan 4;67(5152):1419–27.

⁶⁰ West Virginia Department of Health and Human Resources. West Virginia drug overdose deaths historical overview 2001-2015. Available from: http://dhhr.wv.gov/oeps/disease/ob/documents/opioid/wv-drug-overdoses-2001_2015.pdf (accessed June 18, 2020).

⁶¹ Scholl L, Seth P, Kariisa M, Wilson N, Baldwin G. Drug and Opioid-Involved Overdose Deaths — United States, 2013–2017. *MMWR Morb Mortal Wkly Rep.* 2019 Jan 4;67(5152):1419–27.

⁶² Courtney Hessler, *More than 65 million opioids flooded Cabell County over 7 years, data shows*, The Herald Dispatch (July 19, 2019), https://www.herald-dispatch.com/recent_news/more-than-million-opioids-flooded-cabell-county-over-years-data/article_8f0d8676-a9a9-11e9-98ff-ebdd2586af3f.html (accessed June 18, 2020); *More Than 100 Billion Pain Pills Saturated the Nation Over Nine Years*, The Washington Post (Jan. 14, 2020),

2006 and 2014, over 100 billion opioid pills were distributed throughout the US.

West Virginia received the highest concentration of these opioids with 67 pills per person per year (853.5 million total pills). Cabell County alone received 65 million pills with a population distribution of 96 pills per person per year.⁶³

B. The Increased Use of Heroin And The Relationship With Prescription Opioids

45. For the first time in 100 years, life expectancy at birth has gone down in the US three years in a row from 2014 to 2017.⁶⁴ In 1919, mortality rates shot up because of the ravages of WW1 and the great influenza pandemic. And because these events disproportionately affected young people, correspondingly life expectancy went down. This era's scourge is drug poisoning which is disproportionately affecting young people and driving down life expectancy. According to the latest formal data from the CDC, there were 67,367 drug overdose deaths in the United States, a 4.1% decline from the peak in 2017 (70,237 deaths).⁶⁵ Since the beginning of the opioid epidemic, 700,000 Americans have died from drug poisoning. Annual deaths due to drug

https://www.washingtonpost.com/investigations/more-than-100-billion-pain-pills-saturated-the-nation-over-nine-years/2020/01/14/fde320ba-db13-11e9-a688-303693fb4b0b_story.html, (accessed August 3, 2020).

⁶³ *More Than 100 Billion Pain Pills Saturated the Nation Over Nine Years*, The Washington Post (Jan. 14, 2020), https://www.washingtonpost.com/investigations/more-than-100-billion-pain-pills-saturated-the-nation-over-nine-years/2020/01/14/fde320ba-db13-11e9-a688-303693fb4b0b_story.html (accessed August 3, 2020).

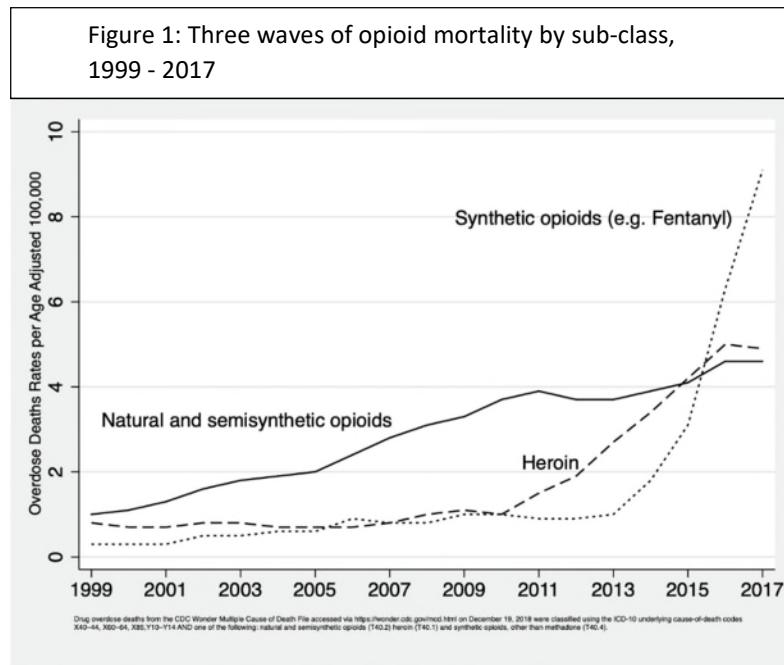
⁶⁴ Murphy SL, Xu JQ, Kochanek KD, Arias E. Mortality in the United States, 2017. NCHS Data Brief, no 328. Hyattsville, MD: National Center for Health Statistics. 2018; Woolf SH, Schoomaker H. Life expectancy and mortality rates in the United States, 1959-2017. JAMA, 2019;322(20):1996-2016. <https://doi:10.1001/jama.2019.16932>

⁶⁵ Hedegaard H, Miniño AM, Warner M. Drug overdose deaths in the United States, 1999-2018. NCHS Data Brief, no 356. Hyattsville, MD: National Center for Health Statistics. 2020.

overdoses now exceed deaths due to car accidents, gun violence, and even HIV at the height of the 1990s HIV epidemic.⁶⁶

46. The triple wave epidemic of overdose deaths stems from three classes of opioids: prescription opioid pills (“natural and semi-synthetic opioids” in Figure 1), heroin, and synthetic opioids other than methadone.⁶⁷ Figure 1 shows three waves of opioid mortality, each wave cresting on top of the one before it.

In the first wave, overdoses related to opioid pills, started rising in the year 2000 and have steadily grown through 2016. The second wave saw overdose deaths due to heroin, which started increasing in 2008, surpassing the number of deaths due to opioid pills in 2015. The third wave of mortality has arisen from illicit fentanyl, fentanyl analogues and other illicit synthetic opioids in the drug supply, climbing slowly at first, but dramatically after 2013. Data from 2017 show synthetic opioid deaths continuing to rise, reaching a peak of over 28,000, while opioid pill and



⁶⁶ Hedegaard H, Miniño AM, Warner M. Drug overdose deaths in the United States, 1999–2017. NCHS Data Brief, no 329. Hyattsville, MD: National Center for Health Statistics. 2018.

⁶⁷ Ciccarone, D. The triple wave epidemic: Supply and demand drivers of the US opioid crisis. International Journal of Drug Policy, <https://doi.org/10.1016/j.drugpo.2019.01.010>.

heroin overdose deaths leveled off, albeit at very high levels of approximately 15,000 deaths in each category.⁶⁸

- a. The rise in overdose mortality in wave one due to prescription opioids (natural and semi-synthetics) has been discussed above (e.g., see paragraph 43.c.). In wave two, heroin-related overdose deaths in the United States have risen six-fold.⁶⁹ Deaths from heroin rose from a rate of 0.8/100,000 population in 2007 to a peak of 4.9/100,000 in 2017 before dropping slightly to 4.7/100,000 in 2018.⁷⁰
- b. In wave three, opioid mortality deaths are being driven by fentanyl-adulterated and substituted heroin (FASH).⁷¹ Deaths due to illicit synthetic opioids (excluding methadone and including fentanyl, fentanyl analogues and non-fentanyl synthetics) have increased 10-fold in number and rate from 3,105 (1.0/100,000 pop.) in 2013

⁶⁸ Hedegaard H, Miniño AM, and Warner M, Drug overdose deaths in the United States, 1999-2017, in NCHS Data Brief no 329. Hyattsville, MD: National Center for Health Statistics. 2018.

⁶⁹ Mars SG, Ondocsin J, Ciccarone D. Sold as Heroin: Perceptions and Use of an Evolving Drug in Baltimore, MD. *J Psychoactive Drugs*. 2017 Dec 06; 1-10. PMID: 29211971. PMCID: PMC6114137.

⁷⁰ Hedegaard H, Miniño AM, Warner M. Drug overdose deaths in the United States, 1999–2018. NCHS Data Brief, no 356. Hyattsville, MD: National Center for Health Statistics. 2020.

⁷¹ Ciccarone D. Fentanyl in the US heroin supply: A rapidly changing risk environment. *Int J Drug Policy*. 2017 08; 46:107-111. PMID: 28735776. PMCID: PMC5742018. Ciccarone D. The triple wave epidemic: Supply and demand drivers of the US opioid overdose crisis. *Int J Drug Policy*. 2019 Feb 01. PMID: 30718120. Mars SG, Ondocsin J, Ciccarone D. Sold as Heroin: Perceptions and Use of an Evolving Drug in Baltimore, MD. *J Psychoactive Drugs*. 2017 Dec 06; 1-10. PMID: 29211971. PMCID: PMC6114137. Ciccarone D, Ondocsin J, Mars SG. Heroin uncertainties: Exploring users' perceptions of fentanyl-adulterated and -substituted 'heroin'. *Int J Drug Policy*. 2017 08; 46:146-155. PMID: 28735775. PMCID: PMC5577861.

to 31,335 (9.9/100,000) in 2018.⁷² It is important to note that this wave continues to grow. The latest provisional data from the CDC shows the third wave continuing to rise with 35,171 deaths attributed to synthetic opioids in the 12-month period through November of 2019, an 11.9% increase from the 12-month period prior to November 2018.

- c. The second and third wave deaths are regional, with the Northeast (including Mid-Atlantic) and Midwest (including Appalachia) being the most affected.⁷³ This has been largely driven by the burgeoning supply of fentanyl.⁷⁴ The notion that the “risk environment” has become more dangerous for users of illicit opioids does not detract from the fundamental claim that current persons who use heroin, especially young people, transitioned in this era from opioid pills to heroin/FASH.⁷⁵ (Discussed further below.) It is also important to recognize that the use of FASH is less about specific choice and more about supply-side imposition, i.e., it is a contamination of the heroin supply.⁷⁶

⁷² Hedegaard H, Miniño AM, Warner M. Drug overdose deaths in the United States, 1999–2018. NCHS Data Brief, no 356. Hyattsville, MD: National Center for Health Statistics. 2020.

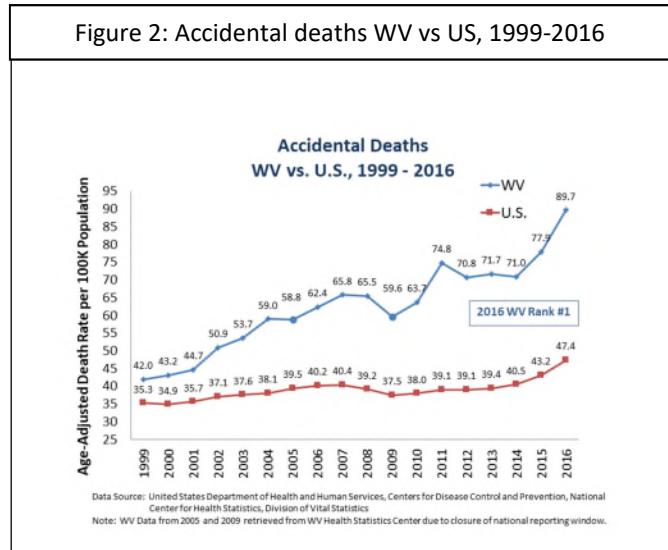
⁷³ Unick GJ, Ciccarone D. US regional and demographic differences in prescription opioid and heroin-related overdose hospitalizations. *Int J Drug Policy*. 2017 08; 46:112-119. PMID: 28688539. PMCID: PMC5722230.

⁷⁴ Gladden RM, Martinez P, Seth P. Fentanyl Law Enforcement Submissions and Increases in Synthetic Opioid–Involved Overdose Deaths — 27 States, 2013–2014. *MMWR Morb Mortal Wkly Rep* 2016;65:837–843. DOI: <http://dx.doi.org/10.15585/mmwr.mm6533a2>external icon

⁷⁵ Unick GJ, Ciccarone D. US regional and demographic differences in prescription opioid and heroin-related overdose hospitalizations. *Int J Drug Policy*. 2017 08; 46:112-119. PMID: 28688539. PMCID: PMC5722230; Ciccarone D. The triple wave epidemic: Supply and demand drivers of the US opioid overdose crisis. *Int J Drug Policy*. 2019 Feb 01. PMID: 30718120.

⁷⁶ Mars SG, Rosenblum D, Ciccarone D. 'Illicit fentanyl in the opioid street market: desired or imposed?' *Addiction*. 2018 Dec 4. doi: 10.1111/add.14474; Ciccarone D, Ondocsin J, Mars SG.

47. West Virginia has been disproportionately affected, compared with the US, by the opioid crisis. Figure 2 shows the dramatic 113.6% rise in accidental death rate in West Virginia from 42.0/100,000 (1999) to 89.7/100,000 (2016).⁷⁷ West Virginia ranked 1st in the country in 2016 for the highest death rate



due to accidents; deaths which have been predominately driven by drug poisoning. While the death rate due to all drugs rose 2.5 times for the US overall (from 6.8/100,000 in 2001 to 16.9 in 2016) it rose 4.5 times for West Virginia (from 10.0 to 46.9).⁷⁸ As stated previously, by 2015 West Virginia had the highest opioid overdose death rate in the US. This was driven first by prescription opioids and then heroin/FASH. Heroin deaths in the state rose by 687% from 2010

Heroin uncertainties: Exploring users' perceptions of fentanyl-adulterated and -substituted 'heroin'. Int J Drug Policy. 2017 08; 46:146-155. PMID: 28735775. PMCID: PMC5577861.

⁷⁷ West Virginia's 10 Leading Causes of Death, 2016 Health Statistics Center Statistical Brief No. 32 West Virginia Dept. of Health and Human Resources. Same reference for Fig. 2.

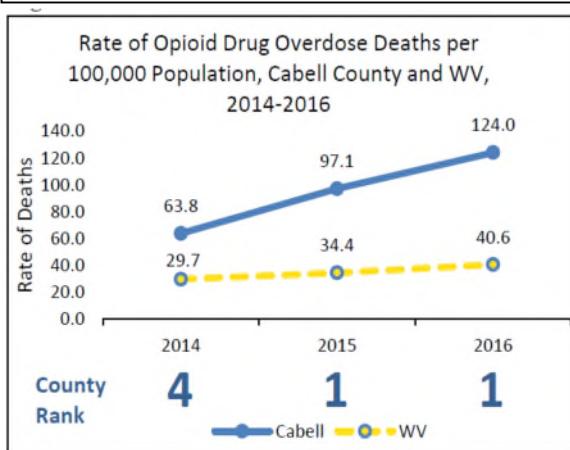
⁷⁸ West Virginia Board of Pharmacy. Prescription Opioid Problematic Prescribing Indicators County Report, Cabell County. October 2017. https://helpandhopewv.org/docs/PFS_County_Reports/Cabell_PfS%20County%20Reports_Final.pdf.

to 2017.⁷⁹ By 2017 fentanyl (and other synthetics) were involved in 74% of all opioid deaths.⁸⁰ In 2016, West Virginia had the highest mortality rate of US states in all three opioid sub-classes (prescription opioids, heroin and fentanyls).⁸¹ Figure 3 shows even greater, and growing, disparities at the county level.⁸²

48. The opioid pill and heroin/FASH

crises are intertwined at the population and individual levels. An early analysis from my team, finding an ecological (i.e., “big picture”) relationship between annual overdoses from prescription opioids and heroin led us to develop a hypothesis that the opioid and heroin epidemics are

Figure 3: Opioid overdose death rate, Cabell County and WV, 2014-2016



⁷⁹ Heroin fast facts. Oct 2018 West Virginia Dept. of Health and Human Resources http://www.wvdhhr.org/bph/hsc/pubs/other/Heroin_Fast_Facts_2017/Heroin_Fast_Stats_2017.pdf (accessed June 19, 2020).

⁸⁰ Synthetic opioid fast fact. Sept 2019. West Virginia Dept. of Health and Human Resources http://www.wvdhhr.org/bph/hsc/pubs/other/SyntheticOpioidFastStats/Synthetic_Opioid_Fast_Stats.pdf (accessed June 19, 2020).

⁸¹ Seth P, Scholl L, Rudd RA, Bacon S. Overdose Deaths Involving Opioids, Cocaine, and Psychostimulants — United States, 2015–2016. MMWR Morb Mortal Wkly Rep. 2018 Mar 30;67(12):349–58.

⁸² West Virginia Board of Pharmacy. Prescription Opioid Problematic Prescribing Indicators County Report, Cabell County. October 2017. https://helpandhopewv.org/docs/PFS_County_Reports/Cabell_PfS%20County%20Reports_Final.pdf.

intertwined.⁸³ Subsequently, a number of investigators have linked the increase in prescription opioid use to the increase in heroin use.⁸⁴

- a. In 2011, the CDC estimated 11 million people reporting nonmedical use of opioid analgesics.⁸⁵ Estimates from the 2015 National Survey on Drug use and Health (NSDUH) state 11.5 million Americans misused prescription opioids and 1.9 million had a use disorder⁸⁶ related to them. The OUD population prevalence of

⁸³ Unick, G. J., Rosenblum, D., Mars, S., & Ciccarone, D. (2013). Intertwined epidemics: National demographic trends in hospitalizations for heroin- and opioid-related overdoses, 1993–2009. *PLoS One*, 8(2), e54496. <http://dx.doi.org/10.1371/journal.pone.0054496>.

⁸⁴ Banerjee, G., Edelman, E. J., Barry, D. T., Becker, W. C., Cerdá, M., Crystal, S., & Marshall, B. D. (2016). Non-medical use of prescription opioids is associated with heroin initiation among US veterans: A prospective cohort study. *Addiction*, 111(11), 2021–2031. <http://dx.doi.org/10.1111/add.13491>. Cerdá, M., Santaella, J., Marshall, B. D., Kim, J. H., & Martins, S. S. (2015). Nonmedical prescription opioid use in childhood and early adolescence predicts transitions to heroin use in young adulthood: A national study. *Journal of Pediatrics*, 167(3), 605–612. <http://dx.doi.org/10.1016/j.jpeds.2015.04.071>. e601-602. Cicero, T. J., Ellis, M. S., & Harney, J. (2015). Shifting patterns of prescription opioid and heroin abuse in the United States. *The New England Journal of Medicine*, 373(18), 1789–1790. <http://dx.doi.org/10.1056/NEJMc1505541>. Cicero, T. J., Ellis, M. S., Surratt, H. L., & Kurtz, S. P. (2014). The changing face of heroin use in the United States: A retrospective analysis of the past 50 years. *JAMA Psychiatry*, 71(7), 821–826. <http://dx.doi.org/10.1001/jamapsychiatry.2014.366>. Compton, W. M., Jones, C. M., & Baldwin, G. T. (2016). Relationship between nonmedical prescription-opioid use and heroin use. *The New England Journal of Medicine*, 374(2), 154–163. <http://dx.doi.org/10.1056/NEJMra1508490>. Dart, R. C., Surratt, H. L., Cicero, T. J., Parrino, M. W., Severtson, S. G., Bucher-Bartelson, B., & Green, J. L. (2015). Trends in opioid analgesic abuse and mortality in the United States. *The New England Journal of Medicine*, 372(3), 241–248. <http://dx.doi.org/10.1056/NEJMsa1406143>. Jones, C. M. (2013). Heroin use and heroin use risk behaviors among nonmedical users of prescription opioid pain relievers—United States, 2002–2004 and 2008–2010. *Drug and Alcohol Dependence*, 132(1–2), 95–100. <http://dx.doi.org/10.1016/j.drugalcdep.2013.01.007>.

⁸⁵ United States Department of Health and Human Services. Addressing Prescription Drug Abuse in the United States at pp., 9-10. See https://www.cdc.gov/drugoverdose/pdf/hhs_prescription_drug_abuse_report_09.2013.pdf

⁸⁶ Han B, Compton WM, Blanco C, Crane E, Lee J, Jones CM. Prescription Opioid Use, Misuse, and Use Disorders in U.S. Adults: 2015 National Survey on Drug Use and Health. *Annals*

0.8% is twice that estimated for the first US opioid epidemic (related to the misuse of morphine, see paragraph 41 above). This huge population developed during the period of excessive supply of prescription opioids (paragraph 42 above).

- b. During this period of huge expansion of persons with opioid misuse or use disorder, there has been a concomitant increase in the number of heroin users. According to NSDUH, the estimated number of heroin users peaked in 2014 at 914,000 having increased 145% since 2007.⁸⁷ Since NSDUH surveys households, it misses persons who are transient, homeless or refuse survey participation. RAND produced a recent estimate, complied from multiple data sources, of *2.3 million heroin users* in 2016, with an upper bound of 4.6 million. The RAND authors state that their estimate may be biased downward: “If the makeup of the population of heroin users in the United States has changed since ADAM [Arrestee Drug Abuse Monitoring program] was terminated in 2013, we may underestimate the true number of chronic users. Given that the composition of treatment admissions and overdose decedents is now more female and less concentrated in a few big cities than was the historical norm, the true number of chronic heroin users in the United States could be as much as double our best estimate”.⁸⁸

of internal medicine. 2017;167(5):293-301. Epub 2017/08/02. doi: 10.7326/m17-0865. PubMed PMID: 28761945.

⁸⁷ Center for Behavioral Health Statistics and Quality. 2014 National Survey on Drug Use and Health: detailed tables. Rockville, MD: Substance Abuse and Mental Health Services Administration, 2015.

⁸⁸ Gregory Midgette, Steven Davenport, Jonathan P. Caulkins, Beau Kilmer. What America’s Users Spend on Illegal Drugs, 2006–2016. RAND Corporation, Santa Monica, CA, 2019.

c. National-level studies support the population-level transition from prescription opioid misuse to heroin. Analyzing NSDUH data from earlier in the epidemic (2002-2004), Becker et al. found that heroin users were 3.9 times as likely to report nonmedical use of opioids in the previous year, as persons who did not use heroin.⁸⁹ Analyzing a later timeframe of NSDUH (2002-2011), Muhuri et al. found that the incidence of heroin use among people who reported prior nonmedical use of prescription opioids was 19 times higher than the incidence among persons who reported no previous nonmedical use.⁹⁰ The “intertwined epidemics” effect was noted as well, albeit of much lower magnitude: the incidence rate of recent non-medical use of prescription opioids was almost 2 times higher among those who reported prior heroin use than who did not (2.8 vs. 1.6 percent).⁹¹ Jones et al., using two more years of NSDUH data (2002-2013), found the likelihood of heroin use disorder is 40 times greater among those reporting prescription opioid use disorder compared with those without prescription opioid use disorder, adjusting for sociodemographic, geographic, and other substance abuse or dependence

⁸⁹ Becker WC, Sullivan LE, Tetrault JM, Desai RA, Fiellin DA. Non-medical use, abuse and dependence on prescription opioids among U.S. adults: psychiatric, medical and substance use correlates. *Drug Alcohol Depend* 2008;94:38-47.

⁹⁰ Muhuri PK, Gfroerer JC, Davies C. Associations of nonmedical pain reliever use and initiation of heroin use in the United States. CBHSQ Data Review, 2013 <https://img3.reoveme.com/m/25e062e91894208c.pdf> (accessed June 20, 2020).

⁹¹ Muhuri PK, Gfroerer JC, Davies C. Associations of nonmedical pain reliever use and initiation of heroin use in the United States. CBHSQ Data Review, 2013 <https://img3.reoveme.com/m/25e062e91894208c.pdf> (accessed June 20, 2020).

characteristics.⁹² Comparing these three studies, which used the same database, we see the risk of transitioning from opioid pill misuse to heroin at the population level increased over time.

- d. Muhuri et al. reported that the rate of heroin initiation increased significantly, 57%, between the first and second waves of the opioid epidemic. They further estimated that 3.6% of nonmedical prescription opioid users initiated heroin use within 5 years after beginning nonmedical use of prescription opioids.⁹³ Considering the substantial size of the population of persons using opioids non-medically, however, this led to sizable increases in the population using heroin. As Wilson Compton, Deputy Director at the National Institute on Drug Abuse, and colleagues note: “given the large number of nonmedical [opioid] users, even a small percentage who initiate heroin use translates into several hundred thousand new heroin users”.⁹⁴
- e. Diversion of the excess opioid supply also increases community-level risk. A recent NASEM report summarizes this issue well: “Opioids pose risks not only to the patients for whom they are prescribed, but also to family members and to the community. Unused opioid pills from opioid prescriptions can be diverted to

⁹² Vital signs: demographic and substance use trends among heroin users — United States, 2002–2013. MMWR Morb Mortal Wkly Rep 2015;64:719-725.

⁹³ Muhuri PK, Gfroerer JC, Davies C. Associations of nonmedical pain reliever use and initiation of heroin use in the United States. CBHSQ Data Review, 2013 <https://img3.reoveme.com/m/25e062e91894208c.pdf> (accessed June 20, 2020).

⁹⁴ Compton, W. M., Jones, C. M., & Baldwin, G. T. (2016). Relationship between nonmedical prescription-opioid use and heroin use. The New England Journal of Medicine, 374(2), 154–163. <http://dx.doi.org/10.1056/NEJMra1508490>.

family members and friends (Bicket et al., 2019;⁹⁵ Hill et al., 2017;⁹⁶ Howard et al., 2019⁹⁷; Thiels et al., 2017⁹⁸). These unused pills, which often are not disposed of properly, may be used by the patient for indications other than those for which they were prescribed (e.g., as a sleep aid), or they may be used by someone other than the patient (Bicket et al., 2017⁹⁹; Jones et al., 2014¹⁰⁰). Individuals with opioid use disorder commonly report that they started by misusing prescription opioids (Ali et

⁹⁵ Bicket MC, White E, Pronovost PJ, Wu CL, Yaster M, Alexander GC. 2019. Opioid oversupply after joint and spine surgery: A prospective cohort study. *Anesthesia & Analgesia* 128(2):358–364.

⁹⁶ Hill MV, McMahon ML, Stucke RS, and Barth RJJ. 2017. Wide variation and excessive dosage of opioid prescriptions for common general surgical procedures. *Annals of Surgery* 265(4):709–714.

⁹⁷ Howard R., Fry B, Gunaseelan V, Lee J, Waljee J, Brummett C, Campbell, Jr. D, Seese E, Englesbe M, and Vu J. 2019. Association of opioid prescribing with opioid consumption after surgery in Michigan. *JAMA Surgery* 154(1):e184234.

⁹⁸ Thiels, CA, Anderson SS, Ubl DS, Hanson KT, Bergquist WJ, Gray RJ, Gazelka HM, Cima RR, and Habermann EB. 2017. Wide variation and overprescription of opioids after elective surgery. *Annals of Surgery* 266(4):564–573.

⁹⁹ Bicket MC, Long JJ, Pronovost PJ, Alexander GC, and Wu CL. 2017. Prescription opioid analgesics commonly unused after surgery: A systematic review. *JAMA Surgery* 152(11):1066–1071.

¹⁰⁰ Jones CM, Paulozzi LJ, and Mack KA. 2014. Sources of prescription opioid pain relievers by frequency of past-year nonmedical use, United States, 2008–2011. *JAMA Internal Medicine* 174(5):802–803.

al., 2019;¹⁰¹ Becker et al., 2008;¹⁰² Cicero et al., 2014¹⁰³; NASEM, 2019¹⁰⁴).

Furthermore, there is an association between the size of a patient's opioid prescription and the likelihood of an opioid overdose among the patient's family members (Khan et al., 2019¹⁰⁵). This association is present in children and adolescents as well as in adults (Khan et al., 2019¹⁰⁶). Among individuals who misuse prescription opioids, the most common source of opioids was pills from family members and friends. Among individuals who use heroin, the majority (66%) previously misused prescription opioids (Cicero et al., 2014¹⁰⁷). Thus, opioid overprescribing, that is, prescribing more opioids than are necessary to

¹⁰¹ Ali MM, Henke RM, Mutter R, O'Brien PL, Cutler E, Mazer-Amirshahi M, and Pines JM. 2019. Family member opioid prescriptions and opioid use disorder. *Addictive Behaviors* 95:58–63.

¹⁰² Becker WC, Sullivan LE, Tetrault JM, Desai RA, and Fiellin DA. 2008. Non-medical use, abuse, and dependence on prescription opioids among U.S. adults: Psychiatric, medical and substance use correlates. *Drug and Alcohol Dependence* 94(1):38–47.

¹⁰³ Cicero TJ, Ellis MS, Surratt HL, and Kurtz SP. 2014. The changing face of heroin use in the United States: A retrospective analysis of the past 50 years. *JAMA Psychiatry* 71(7):821–826.

¹⁰⁴ National Academies of Science, Engineering and Medicine. 2019. Medications for opioid use disorder save lives. Washington, DC: The National Academies Press.

¹⁰⁵ Khan NF, Bateman BT, Landon JE, and Gagne JJ. 2019. Association of opioid overdose with opioid prescriptions to family members. *JAMA Internal Medicine* 179(9):1186–1192.

¹⁰⁶ Khan NF, Bateman BT, Landon JE, and Gagne JJ. 2019. Association of opioid overdose with opioid prescriptions to family members. *JAMA Internal Medicine* 179(9):1186–1192.

¹⁰⁷ Cicero TJ, Ellis MS, Surratt HL, and Kurtz SP. 2014. The changing face of heroin use in the United States: A retrospective analysis of the past 50 years. *JAMA Psychiatry* 71(7).

control a patient's acute pain, is a factor contributing to the public health epidemic of opioid overdoses.”¹⁰⁸

f. Another key report from NASEM sums up the intertwining of the prescription opioid and heroin waves: “A preponderance of evidence suggests that the major increase in prescription opioid use beginning in the late 1990s has served as a gateway to increased heroin use... The interrelated nature of the prescription and illicit opioid epidemics means that one cannot be addressed separately from the other.”¹⁰⁹

49. At the individual level, there is also good evidence of transitioning from opioid pills use/misuse/use disorder to heroin use. Prescription opioids and heroin are substitutable, i.e., both can stave off withdrawal symptoms and produce the desired psychoactive effects. Use of either can lead to developing OUD (see section IV.A above). Without treatment, OUD, from any starting opioid, is progressive through the mechanisms of tolerance, dependence, compulsive use and craving.

a. Heroin is structurally similar to typical prescription opioids, e.g., oxycodone, and thus functional effects are similar. For example, a study involving persons who use heroin showed that the reinforcing effects of oxycodone were similar to those

¹⁰⁸ National Academies of Sciences, Engineering, and Medicine 2020. Framing Opioid Prescribing Guidelines for Acute Pain: Developing the Evidence. Washington, DC: The National Academies Press. <https://doi.org/10.17226/25555>.

¹⁰⁹ National Academies of Science Engineering and Medicine. Pain Management and the Opioid Epidemic: Balancing Societal and Individual Benefits and Risks of Prescription Opioid Use.; 2017. doi:10.17226/24781.

produced by morphine or heroin.¹¹⁰ Several prescription opioids, e.g., oxycodone, hydromorphone, morphine, and fentanyl, have abuse potential that is similar to that of heroin.¹¹¹

- b. It has been reported that legitimate medical use of opioids for pain is a common precursor to misuse of those same drugs, thus providing the initial step in the transition from medical use of prescription opioids, to non-medical use, and for some, ultimately to heroin/FASH.¹¹²
- c. A number of studies strongly support my opinion that prescription opioid misuse has been a recent “gateway” for initiation of heroin use.¹¹³
- d. Estimates of the proportion of individuals reporting misuse of prescription opioids prior to initiating heroin range, in different US locations, from 39 to 86 percent.¹¹⁴

¹¹⁰ Comer SD, Sullivan MA, Whittington RA, Vosburg SK, Kowalczyk WJ. Abuse liability of prescription opioids compared to heroin in morphine-maintained heroin abusers. *Neuropsychopharmacology* 2008;33:1179-1191

¹¹¹ Ternes JW, O’Brien CP. The opioids: abuse liability and treatments for dependence. *Adv Alcohol Subst Abuse* 1990;9:27-45 Comer SD, Sullivan MA, Whittington RA, Vosburg SK, Kowalczyk WJ. Abuse liability of prescription opioids compared to heroin in morphine-maintained heroin abusers. *Neuropsychopharmacology* 2008;33:1179-1191.

¹¹² McCabe, et al., *Pediatrics* 2017; 139:1-9.

¹¹³ Cicero TJ, Ellis MS, Surratt HL, and Kurtz SP. 2014. The changing face of heroin use in the United States: A retrospective analysis of the past 50 years. *JAMA Psychiatry* 71(7); Compton et al, NEJM, 2016; Grau, L. E., Dasgupta, N., Harvey, A. P., Irwin, K., Givens, A., Kinzly, M. L., & Heimer, R. (2007). Illicit use of opioids: Is OxyContin a "gateway drug"? *The American Journal on Addictions*, 16(3), 166–173. <http://dx.doi.org/10.1080/10550490701375293>; Mars, S., Bourgois, P., Karandinos, G., Montero, F., & Ciccarone, D. (2014). "Every 'never' I ever said came true": Transitions from opioid pills to heroin injecting. *International Journal of Drug Policy*, 25(2), 257–266. <http://dx.doi.org/10.1016/j.drugpo.2013.10.004>

¹¹⁴ Lankenau SE, Teti M, Silva K, Bloom JJ, Harocopoulos A, Treese M. Initiation into prescription opioid misuse amongst young injection drug users. *Int J Drug Policy*. 2012;23(1):37-44; Pollini RA, Banta-Green CJ, Cuevas-Mota J, Metzner M, Teshale E, Garfein RS. Problematic use of prescription-type opioids prior to heroin use among young heroin injectors. *Subst Abuse*

Muhuri et al. in a national study found that 79.5% of persons who recently began using heroin had used prescription opioids non-medically before initiating heroin use.¹¹⁵ In a key retrospective analysis of almost 3,000 persons entering treatment for heroin use disorder, Cicero and colleagues found that the sub-type of opioid first use changed depending on when this use initiated. For current heroin users reporting first use in the 1960s, 80% reported starting with heroin; in contrast, 75% of those entering treatment for heroin use disorder in the 2000s reported that their first regular opioid was a prescription opioid.¹¹⁶

50. Our team, using in-depth qualitative methods, has explored heroin initiation during the wave one to wave two overlap. Our paper, “*Every ‘Never’ I Ever Said Came True*”: *Transitions from opioid pills to heroin injecting*, led by HIT Co-Investigator Dr. Sarah Mars, has had a crucial impact on the field. Some important insights and observations from this paper:

- a. We interviewed a spectrum of current heroin users in two cities, locations contrasting in demographics and heroin source supplies, between 2010 and 2012. The purpose of the study was to deeply examine ways in which heroin use was

Rehabil 2011;2:173-180; Peavy KM, Banta-Green CJ, Kingston S, Hanrahan M, Merrill JO, Coffin PO. “Hooked on” prescription-type opiates prior to using heroin: results from a survey of syringe exchange clients. J Psychoactive Drugs 2012;44:259-265.

38. Mateu-Gelabert P, Guarino H, Jessell L, Teper A. Injection and sexual HIV/HCV risk behaviors associated with nonmedical use of prescription opioids among young adults in New York City. J Subst Abuse Treat 2015;48:13-20.

¹¹⁵ Muhuri PK, Gfroerer JC, Davies C. Associations of nonmedical pain reliever use and initiation of heroin use in the United States. CBHSQ Data Review, 2013 <https://img3.reoveme.com/m/25e062e91894208c.pdf> (accessed June 20, 2020).

¹¹⁶ Cicero TJ, Ellis MS, Surratt HL, and Kurtz SP. 2014. The changing face of heroin use in the United States: A retrospective analysis of the past 50 years. JAMA Psychiatry 71(7).

initiated. We found distinct differences between those who transitioned from pills to heroin (“pill initiates”) and those who started their opioid use with heroin (“heroin initiates”). Pill initiates were younger with fewer years of heroin use. In Philadelphia, 14 of the 22 participants were pill initiates with a mean age of 31 and 7 mean years’ use. Among the eight heroin initiates, the mean age was 44 and their mean years’ use was 23. In San Francisco, 11 of the 19 heroin injectors were pill initiates, with a mean age of 29 and mean years’ use of 5.8. The eight heroin initiates had a mean age of 50 years and their mean years’ use was 20.

- b. Across both cities, younger heroin injectors (aged 20–29) had almost exclusively progressed to heroin from opioid pills while older heroin injectors (30 years and above) typically exemplified the heroin-first trajectory. The initiation of younger users into heroin through opioid pills coincided with the past decade and a half of high levels of opioid pill prescribing. Among younger pill initiates in both cities, the mean year of initiating opioid pill use was 2005 and the mean year of starting heroin use was 2008. (Note: this corresponds with the beginning of wave two of the triple wave epidemic.)
- c. Young and new (< 3 years) heroin users described transitioning to heroin from opioid pills as their growing dependence required larger and more consistent pill supplies than they could obtain either by prescription or on the street. The more ready availability of high purity, low cost heroin made the switch to heroin economically logical and difficult to resist.
- d. There were some notable differences in the sourcing of the opioid pills used. While almost all of the younger pill initiates described transitioning to heroin after

becoming dependent on (usually) diverted prescription opioids, most of the older pill initiates had either developed a dependence on opioids prescribed to them for injury/pain, or they had used opioid pills only occasionally prior to heroin without reporting dependence.

- e. Pill initiates' introduction to opiates was facilitated by the lesser stigma and perceived lower risk of opioid pills and many stated that they would never have considered trying heroin had they not first become dependent on these pills. Despite the fact that many of the pill initiates were aware of the chemical similarity of opioids and heroin, they perceived pills to be more acceptable and safer than heroin.
- f. Pill initiates described how friends they had known for a long time had guided them along the same path, using opioids first and then heroin, leading them to new sources and modes of administration as they followed in their tracks.
- g. The title of the paper reflects the force of stigmatization in retarding the processes of pill-to-heroin transitions and especially the progression to drug injection. For most pill initiates, injecting any drug started with heroin and those who injected crushed pills did so only after they had started injecting heroin. Person after person told stories of crossing thresholds of stigmatized behavior at each stage, attributing each progression to their growing dependence, tolerance and craving – i.e., addiction – the rising cost of their pill habit coupled with their need to avoid withdrawal symptoms and heroin's comparatively, at times, easier availability and lower cost.

h. Street dealers quickly understood this intertwined opioid-to-heroin environment.

Dealers, often “user-dealers”, kept a supply of heroin to offer clients in case pills were in short supply. One participant remarked, “That’s actually how I’ve gotten a lot of people accidentally hooked on heroin.” Many pill initiates reported that their usual dealers offered them heroin when they were unable to obtain opioid pills for street sale. Several described their initial reluctance to try heroin, requiring persuasion regarding the equivalence of opioids and heroin or reassurance that they would not have to inject. Others reported simply giving in to the frustration of trying to maintain or afford a regular pill supply.

i. One quote from the paper sums up the opioid pill to heroin transition phenomenon for an individual. This respondent is a 51-year-old man who was originally prescribed “Percocet” (brand name for short-acting oxycodone) for a knee injury and despite initially resolving not to use heroin had done so 5–6 years prior to the interview: “I guess like a lot of people, you start on the pills, and then the doctor gives you some and some more … I took what he gave me, plus whatever – [buying more] on the street, and at some point in time, just the pills aren’t doin’ it, and they’re a little harder to find. … Every morning we would go to the one place and they had both things [heroin and pills] … they never were out of heroin, but once in a while – well, three times a week probably, they didn’t have the pills. So I’d have to scramble around, and then I finally had enough and said ‘Fuck. The hell with this, give me a bag [of heroin]!’ and was off to the races.”

j. The “*Every Never*” paper was published in 2014. Since then we have completed ethnographic investigations on heroin use in numerous locations including West

Virginia, e.g., Charleston (2017), Huntington (2019), and surrounding towns. We have made similar observations (in papers drafted but not yet published) on the issue of opioid pill to heroin transitioning, now in a later part of the epidemic. For example, in Charleston in 2017, all 19 of our (heroin using) respondents had extensive experience using prescription opioid pills and most initiated with them while only one did so with heroin. While prescription opioids remained more available than in other HIT fieldwork locations, heroin/FASH has quickly captured a large share of the opioid-using market. One new person who injects heroin, in her thirties and injecting for only six months, thought that heroin had achieved primacy among her peers, stating: “Everybody is on heroin. Heroin, heroin, heroin.”¹¹⁷ A 2017 DEA intelligence report on the drug situation in West Virginia states that illicit controlled prescription drug (CPD), especially opioids, use remains widespread; driven by industrial (injury-prone) jobs, high levels of unemployment (second highest in the US) and excessive opioid prescribing practices. However, heroin use and deaths have been rising since 2011: “Many CPD users who have developed an opioid addiction are seeking heroin, which is generally cheaper and sometimes easier to obtain, as their opiate of choice.”¹¹⁸

¹¹⁷ Ondocsin J, Mars S and Ciccarone D. “Just let them all overdose”: hostility, compassion and role reversal in West Virginia’s long opioid overdose emergency. Unpublished draft paper.

¹¹⁸ The West Virginia Drug Situation, DEA Intelligence report, DEA-WAS-DIR-024-17, May, 2017.

51. Professors Nabarun Dasgupta, Leo Beletsky, and I wrote a commentary, published in 2018, exploring the “demand-”, as opposed to “supply-”, side of the opioid epidemic.¹¹⁹ It was meant as a stimulating theoretical essay. Entitled *Opioid Crisis: No Easy Fix to Its Social and Economic Determinants*, we claimed that decades of economic distress, declines in inter-generational working class opportunities and other social misfortunes may have contributed to the so-called “deaths of despair,”¹²⁰ which include rising mortality, especially among middle-aged Whites without a college degree, due to drug overdose. We stated: “Contraindicating the singular blame on health care as the gateway to addiction, individuals entering drug treatment are now more likely to report having started opioid use with heroin, not a specific prescription analgesic” and “the unrealistic expectation that curtailing dispensing will automatically reduce overdose.”¹²¹ The first point comes from Cicero and colleagues, the same team that reported that 75% of recent heroin users entering treatment started their opioid use with prescription pills,¹²² who, looking at later data in their survey, report that heroin as the initiating opioid rose from 9% (2005) to 33% (2015) among their respondents.¹²³ In retrospect, the first statement was accurate only to the extent that

¹¹⁹ Dasgupta N, Beletsky L, Ciccarone D. Opioid Crisis: No Easy Fix to Its Social and Economic Determinants. *Am J Public Health*. 2018 Feb; 108(2):182-186. PMID: 29267060. PMCID: PMC5846593.

¹²⁰ Dasgupta N, Beletsky L, Ciccarone D. Opioid Crisis: No Easy Fix to Its Social and Economic Determinants. *Am J Public Health*. 2018 Feb; 108(2):182-186. PMID: 29267060. PMCID: PMC5846593.

¹²¹ Dasgupta N, Beletsky L, Ciccarone D. Opioid Crisis: No Easy Fix to Its Social and Economic Determinants. *Am J Public Health*. 2018 Feb; 108(2):182-186. PMID: 29267060. PMCID: PMC5846593.

¹²² Cicero TJ, Ellis MS, Surratt HL, and Kurtz SP. 2014. The changing face of heroin use in the United States: A retrospective analysis of the past 50 years. *JAMA Psychiatry* 71(7):821–826.

¹²³ Cicero TY, Ellis MS, Kasper ZA. Increased use of heroin as an initiating opioid of abuse. *Addictive Behaviors*. 74 (2017) 63-66.

it compared heroin initiation with initiation by a “specific” prescription opioid; when all prescription opioids are considered cumulatively, as of 2015, initiation with those pills occurred in 2/3 of the cases, compared to 1/3 with heroin. The second point is in acknowledgement that while opioid prescribing declined 13% nationally between 2012 and 2015,¹²⁴ the national overdose death rate from prescription opioids continued to rise 11% during those years.¹²⁵ The reasons for this mismatch in trends may be misclassification of deaths, time lags and stockpiles of unused meds;¹²⁶ as well as counterfeit prescription pills.¹²⁷

- a. Although Dasgupta et al argues that social and structural forces, e.g., despair, isolation, economic distress and community fragmentation, may be operative to accelerate demand, a well done econometric study shows that supply forces have more explanatory power. In this analysis, measures of economic changes in economic conditions explain less than one-tenth of the observed increase in drug deaths.¹²⁸ A very recent analysis supports the supply-side argument over the

¹²⁴ US Food and Drug Administration. Utilization patterns of opioid analgesics in the pediatric population, background package addendum. Available at: <https://www.fda.gov/downloads/AdvisoryCommittees/CommitteesMeetingMaterials/Drugs/AnestheticAndAnalgesicDrugProductsAdvisoryCommittee/UCM519724.pdf>.

¹²⁵ Hedegaard H, Miniño AM, Warner M. Drug overdose deaths in the United States, 1999–2018. NCHS Data Brief, no 356. Hyattsville, MD: National Center for Health Statistics. 2020.

¹²⁶ Dasgupta N, Beletsky L, Ciccarone D. Opioid Crisis: No Easy Fix to Its Social and Economic Determinants. Am J Public Health. 2018 Feb; 108(2):182-186. PMID: 29267060. PMCID: PMC5846593.

¹²⁷ Counterfeit Prescription Pills Containing Fentanyls: A Global Threat. DEA Intelligence Brief, DEA-DCT-DIB-021-16, JULY 2016 <https://www.dea.gov/sites/default/files/docs/Counterfeit%2520Prescription%2520Pills.pdf> (accessed June 26, 2020).

¹²⁸ Ruhm CJ. Deaths of Despair or Drug Problems? NBER Working Paper No. 24188, NBER Program(s):Health Care, Health Economics, Public Economics (2017).

demand-side argument.¹²⁹ My current opinion is that opioid supply is the stronger of the two forces in driving use and consequences.

b. I wrote the *Triple Wave Epidemic* paper to discuss the complexities of the supply and demand forces in the opioid epidemic, arguing that both were needed to drive this historically large phenomenon.¹³⁰ And while both supply and demand forces are needed, they are intertwined and blossoming from the root cause: excessive opioid pill supply. In tying together my understanding of the “triple wave,” I state: “In summary, all three waves have impressive supply-side drivers including excessive prescribing of medication, a new form of highly refined Mexican-sourced heroin and a new illicit source of synthetic opioids adulterating heroin and counterfeit pills. Demand for opioid pills drove demand for heroin while demand for heroin unsuspectingly feeds demand for synthetics-as-substitute.” Bottom line: excessive opioid pill supply drove population demand for opioids through dependency and misuse, cueing up demand for heroin/FASH.

C. The Growth in Heroin Use and Overdose is Particularly Acute among Younger People

52. The number of heroin users, especially young heroin users, has been increasing since the mid-2000s.¹³¹ (See paragraph 48.b above.)

¹²⁹ Thombs RP, Thombs DL, Jorgenson AK, Braswell TH. What Is Driving the Drug Overdose Epidemic in the United States? *Journal of Health and Social Behavior*. First Published July 16, 2020, <https://doi.org/10.1177/0022146520939514/>

¹³⁰ Ciccarone D. Fentanyl in the US heroin supply: A rapidly changing risk environment. *Int J Drug Policy*. 2017 08; 46:107-111. PMID: 28735776. PMCID: PMC5742018.

¹³¹ Substance Abuse and Mental Health Services Administration. (2017). Key substance use and mental health indicators in the United States: Results from the 2016 National Survey on Drug Use and Health (HHS Publication No. SMA 17-5044, NSDUH Series H-52). Rockville, MD:

53. Dr. Jay Unick, professor at the University of Maryland School of Social Work and co-investigator on the HIT study, studied the demographics of opioid overdose during the wave two heroin phenomenon just prior to the introduction of fentanyl. Examining the years 2012–2014, we found that the peak age group for heroin overdose admissions was 20 to 34 year-olds. In addition, this data provides evidence of population level transitions from opioid pills to heroin use as the rates for overdose among 20–34 year olds declined for opioid pills while, in the same time period, increased for heroin.¹³²

54. In our *Every ‘Never’* paper, we reported that young and new heroin users described transitioning to heroin from prescription opioids as their growing dependence required larger and more consistent pill supplies than they could obtain either by prescription or on the street. We conclude: “From the accounts of younger/recent heroin injectors in this study, it is evident that since the rise of the opioid pill epidemic, the barriers to heroin use and to injection have been reduced by the normalized pervasiveness of these pharmaceuticals.”¹³³

D. The Role of “Abuse-Deterrent” Opioids

55. In 2010, OxyContin (i.e., brand named long-acting oxycodone formulation) was reformulated to be “abuse-deterrent.” Abuse-deterrent formulations of medications attempt to deter use other than though oral ingestion, e.g., by crushing and insufflating, or solubilizing and injecting. The preferred use of OxyContin for misuse or to “get high” fell significantly after

Center for Behavioral Health Statistics and Quality, Substance Abuse and Mental Health Services Administration. Retrieved from <https://www.samhsa.gov/data/> on June 26, 2020.

¹³² Unick and Ciccarone. US regional and demographic differences in prescription opioid and heroin-related overdose hospitalizations. IJDP 46 (2017) 112-119.

¹³³ Mars S, Bourgois P, Karandinos G, Montero F, Ciccarone D. "Every 'Never' I Ever Said Came True": Transitions from opioid pills to heroin injecting. International Journal of Drug Policy. 2014 Mar;25(2):257-66. PMID: 24238956.

reformulation, and use of heroin went up in a treatment seeking population.¹³⁴ Thus, an unintended consequence of the reformulation was a proportion of the at-risk population being driven to heroin.¹³⁵

56. The *Every 'Never'* paper documents a number of stories from folks who used OxyContin prior to heroin. For example, one 29-year-old heroin injector explained how the reformulation had prompted his switch to injecting: "I was big into OxyContin at first . . . and I still used heroin a little bit when OxyContin was crushable, but at that point I only sniffed, and I only did it when I had problems finding OxyContin. It wasn't until the OxyContin switched from OC [original] to OP [abuse deterrent], and the non-tamper-proof versions [sic], that I really just went straight to heroin and immediately started shooting it, which I guess was a little over a year ago."¹³⁶

57. The DEA anticipated this, sending out warnings to various health care organizations at the time of the reformulation, stating that OxyContin users switching to heroin was a potential consequence.¹³⁷

58. A recent econometric analysis examines the short- and long-term effects of OxyContin reformulation by comparing overdose trajectories in areas more exposed to

¹³⁴ Cicero and Surratt, Effect of Abuse-Deterrent Formulation of OxyContin, 2012 N Engl J Med 2012; 367:187-189 DOI: 10.1056/NEJMc1204141.

¹³⁵ Ciccarone D. The triple wave epidemic: Supply and demand drivers of the US opioid overdose crisis. Int J Drug Policy. 2019 Feb 01. PMID: 30718120.

¹³⁶ Mars S, Bourgois P, Karandinos G, Montero F, Ciccarone D. "Every 'Never' I Ever Said Came True": Transitions from opioid pills to heroin injecting. International Journal of Drug Policy. 2014 Mar;25(2):257-66. PMID: 24238956.

¹³⁷ Mars S, Bourgois P, Karandinos G, Montero F, Ciccarone D. "Every 'Never' I Ever Said Came True": Transitions from opioid pills to heroin injecting. International Journal of Drug Policy. 2014 Mar;25(2):257-66. PMID: 24238956.

reformulation to less exposed areas. The results support my opinion that reformulation continues to play a meaningful role in explaining the rise in both heroin and fentanyl overdoses as described by the triple wave, e.g., a state with a one standard deviation higher rate of OxyContin misuse (prior to reformulation) experienced an additional 4.6/100,000 synthetic opioid overdoses due to higher exposure to reformulation. The authors interpret their data in line with the supply and demand dynamics stated in my *Triple Wave* paper:¹³⁸ "...heroin overdoses increased immediately after reformulation indicates an expansion in the illicit market in terms of the number of users, followed by an evolution in the substances. ... One interpretation of this finding is that the OxyContin reformulation led some individuals to move from prescription opioids to illicitly-produced and -sold opioids, expanding demand in the illicit market."¹³⁹ It is important to recognize that the act of reformulation is a mid-stage event in a process that was already ongoing, i.e., the huge increase, in wave one, of persons developing dependency on, misuse of, addiction to, prescription opioids. (See paragraph 48 above.) It is also important to remember that just because a prescription opioid is reformulated, the drug still remains highly addictive and may still be abused or misused by, for example, swallowing the drug. Abuse-deterrent formulations do not prevent OUD or reduce the risk of opioid dependency.

¹³⁸ Ciccarone D. The triple wave epidemic: Supply and demand drivers of the US opioid overdose crisis. *Int J Drug Policy*. 2019 Feb 01. PMID: 30718120.

¹³⁹ The Evolving Consequences of OxyContin Reformulation of Drug Overdoses, David Powell & Rosalie Liccardo Pacula Working Paper 26988, <http://www.nber.org/papers/w26988>.

E. Harms Related to Intravenous Drug Use

59. The opioid crisis currently affecting the United States has resulted in unprecedented overdose mortality with approximately 47,600 deaths involving opioids in 2017 alone.¹⁴⁰ Annual deaths have increased with each wave of the triple wave opioid epidemic. (See paragraph 46 above.) Driving wave two is an increasing population of heroin users driven by dependency on prescription opioids. (See paragraph 48 above.) Chronic heroin users have been estimated to have increased since 2006 from 1.6 to 2.3 million in 2016 although the number could be double.¹⁴¹

60. There are other medical consequences, in addition to overdose, that are growing in concern. The change from opioid pill misuse to heroin involved, for many, a change in route of administration from oral ingestion to intravenous injection.¹⁴² While heroin can be smoked or insufflated, it tends, in the US, to be injected.¹⁴³ This raises concerns about the transmission of blood-borne viruses such as hepatitis C (HCV) and HIV. Heroin initiation has a faster path to injection and a higher rate of progression to injection compared with other potentially injectable drugs.¹⁴⁴

¹⁴⁰ Scholl L, Seth P, Kariisa M, Wilson N, Baldwin G. Drug and Opioid-Involved Overdose Deaths — United States, 2013–2017. MMWR Morb Mortal Wkly Rep. 2019 Jan 4;67(5152):1419–27.

¹⁴¹ Gregory Midgette, Steven Davenport, Jonathan P. Caulkins, Beau Kilmer. What America's Users Spend on Illegal Drugs, 2006–2016. RAND Corporation, Santa Monica, CA, 2019.

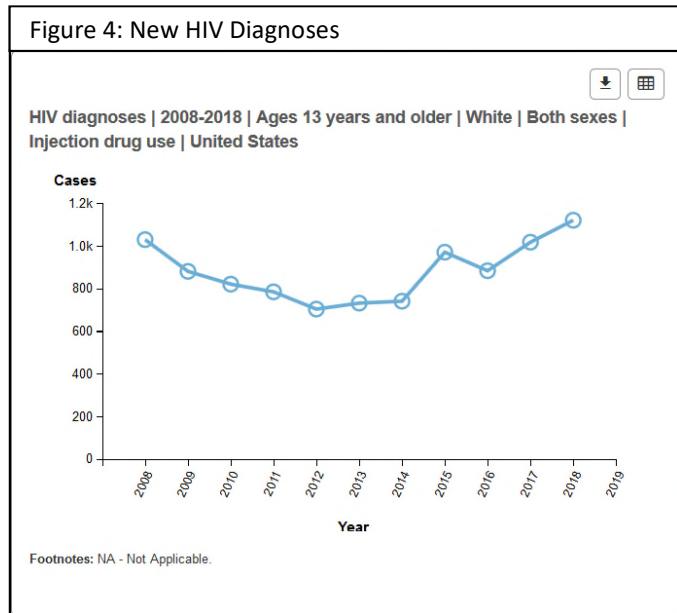
¹⁴² Mars S, Bourgois P, Karandinos G, Montero F, Ciccarone D. "Every 'Never' I Ever Said Came True": Transitions from opioid pills to heroin injecting. International Journal of Drug Policy. 2014 Mar;25(2):257-66. PMID: 24238956.

¹⁴³ Ciccarone, D. (2019). Heroin smoking is not common in the United States. JAMA Neurology. <https://doi.org/10.1001/jamaneurol.2019.0183>.

¹⁴⁴ Bluthenthal RN, Wenger L, Chu D, Lorvick J, Quinn B, Thing JP, et al. Factors associated with being asked to initiate someone into injection drug use. Drug Alcohol Depend. 2015 Apr 1;149:252–8.

61. In the US from 2014 through 2018, the number of, and the percentage of total, new diagnoses of HIV infection attributed to injection drug use increased.¹⁴⁵ This is seen more vividly among White people who inject drugs (PWID) (Figure 4¹⁴⁶). Recent outbreaks of HIV among PWID in several US states represent a warning of a wider resurgence of the virus

in this population.



- a. Several non-urban HIV outbreaks and clusters in recent years have occurred in the US. Between November 2014 and November 2015, 181 people in Scott County, Indiana were diagnosed with HIV infection compared to 2004-2013 when that same county only had 5 total cases. Of those with HIV, 159 persons (87.8%) reported injection use of extended-release oxymorphone.¹⁴⁷ Use of this oxymorphone formulation was seen as risky for HIV transmission due to multiple injections per

¹⁴⁵ Centers for Disease Control and Prevention. HIV Surveillance Report, 2018 (Updated); vol. 31. <http://www.cdc.gov/hiv/library/reports/hiv-surveillance.html>. Published May 2020 (accessed June 27, 2020).

¹⁴⁶ Source for Figure 4: <https://gis.cdc.gov/grasp/nchhstpatlas/charts.html> (accessed June 27, 2020).

¹⁴⁷ Peters PJ, Pontones P, Hoover KW, Patel MR, Galang RR, Shields J, et al. HIV infection linked to injection use of oxymorphone in Indiana, 2014–2015. New England Journal of Medicine. 2016;375(3):229–239.

use episode as well as syringe/equipment sharing related to social factors such as drug pricing, availability, reciprocity and resource-pooling.¹⁴⁸

- b. A 2017 HIV outbreak in West Virginia diagnosed 57 cases across 15 counties identified as among the US counties most vulnerable to rapid transmission of HIV/HCV due to injection drug use.¹⁴⁹ These counties shared some characteristics with Scott County, including high numbers of overdose deaths, widespread availability of prescription opioids, unemployment and low syringe access.¹⁵⁰ A localized cluster of injection-related HIV cases has been reported Cabell County, West Virginia, that has reached 90 cases by June 11, 2020.¹⁵¹
- c. Massachusetts has experienced an increase in HIV cases attributed to injection drug use, with 52 cases reported in 2017 in the northeast corner of the state¹⁵² where

¹⁴⁸ Conrad C, Bradley HM, Broz D, Buddha S, Chapman EL, Galang RR, et al. Community Outbreak of HIV Infection Linked to Injection Drug Use of Oxymorphone—Indiana, 2015. MMWR Morbidity and mortality weekly report. 2015;64(16):443–444. Broz, D., et al., Multiple injections per injection episode: High-risk injection practice among people who injected pills during the 2015 HIV outbreak in Indiana. Int J Drug Policy, 2018. 52: p. 97-101.

¹⁴⁹ Evans ME, Labuda SM, Hogan V, Agnew-Brune C, Armstrong J, Karupiah ABP, et al. Notes from the Field: HIV Infection Investigation in a Rural Area—West Virginia, 2017. MMWR Morb Mortal Wkly Rep. 2018;67:257–8; Van Handel MM, Rose CE, Hallisey EJ, Kolling JL, Zibbell JE, Lewis B, et al. County-Level Vulnerability Assessment for Rapid Dissemination of HIV or HCV Infections Among Persons Who Inject Drugs, United States: JAIDS Journal of Acquired Immune Deficiency Syndromes. 2016 Nov;73(3):323–31; Lurie, J., HIV Is Spreading in West Virginia. The Solution Is in Short Supply, in Mother Jones. 2019.

¹⁵⁰ Evans ME, Labuda SM, Hogan V, Agnew-Brune C, Armstrong J, Karupiah ABP, et al. Notes from the Field: HIV Infection Investigation in a Rural Area—West Virginia, 2017. MMWR Morb Mortal Wkly Rep. 2018;67:257–8.

¹⁵¹ <https://oeps.wv.gov/hiv-aids/Pages/default.aspx> (accessed June 27, 2020).

¹⁵² Felice J. Freyer, *HIV is surging in Lawrence and Lowell. The CDC wants to know why*, The Boston Globe (Apr. 5, 2018), <https://www.bostonglobe.com/metro/2018/04/05/cdc->

heroin/FASH is endemic.¹⁵³ A 2018 investigation by the CDC, in collaboration with the Massachusetts Department of Public Health, in Lawrence and Lowell, found 129 persons diagnosed with HIV between 2015 and 2018 who met the case definition for this outbreak. 86% of these cases were transmitted through injection drug use and 90% had HCV co-infection.¹⁵⁴

- d. The most recent US cluster, identified in 2018, occurred in Seattle, Washington among people living homeless and was attributed to drug injecting and heterosexual sex with and among PWID.¹⁵⁵

62. It is estimated that 3.5 million people in the US are infected with HCV¹⁵⁶ with prevalence estimates among PWID of up to 90%.¹⁵⁷ HCV incidence among young people

[investigate-puzzling-surge-hiv-lawrence-lowell-among-injecting-drug-users/XHgt4NKAwdxVKgdzH8TZbI/story.html](https://www.cdc.gov/mmwr/volumes/68/15/mm6815a1.htm#investigate-puzzling-surge-hiv-lawrence-lowell-among-injecting-drug-users/XHgt4NKAwdxVKgdzH8TZbI/story.html) (accessed June 27, 2020).

¹⁵³ Ciccarone D, Ondocsin J, Mars SG. Heroin uncertainties: Exploring users' perceptions of fentanyl-adulterated and-substituted 'heroin.' International Journal of Drug Policy. 2017;46:146–155.

¹⁵⁴ CDC, Epi-2: Preliminary Epi-Aid Report: Undetermined Risk Factors and Mode of Transmission for HIV Infection Among Persons Who Inject Drugs — Massachusetts, 2018. Atlanta, GA; 2018.

¹⁵⁵ Golden MR, Lechtenberg R, Glick SN, Dombroshi J, Duchin J, Reuer JR, et al. Outbreak of Human Immunodeficiency Virus Infection Among Heterosexual Persons Who Are Living Homeless and Inject Drugs — Seattle, Washington, 2018. Morbidity and Mortality Weekly Report. 2019;68(15):344–9.

¹⁵⁶ Centers for Disease Control and Prevention. Viral Hepatitis Surveillance - United States, 2016. 2016;75.35; Edlin BR, Eckhardt BJ, Shu MA, Holmberg SD, Swan T. Toward a more accurate estimate of the prevalence of hepatitis C in the United States. Hepatology. 2015 Nov 1;62(5):1353–63.

¹⁵⁷ Hernandez MD, Sherman KE. HIV/HCV Coinfection Natural History and Disease Progression, A Review of The Most Recent Literature. Curr Opin HIV AIDS. 2011 Nov;6(6):478–82.

increased 2006-2012, with annual increases more than double in nonurban areas.¹⁵⁸ These increases were highest in the eastern half of the US, most notably Appalachia, where opioid prescribing rates were among the highest in the nation.¹⁵⁹ Prescription opioids can be crushed and injected and their use may also result in transitions to heroin injection.¹⁶⁰ HCV incidence continued to rise year on year, during the third wave of the triple wave opioid epidemic, from 2013-2017.¹⁶¹

63. In addition to viral disease transmission, injection drug use is associated with bacterial infections, including, e.g., skin and soft tissue infections (SSTI)¹⁶² and endocarditis.¹⁶³

¹⁵⁸ Suryaprasad AG, White JZ, Xu F, Eichler B-A, Hamilton J, Patel A, et al. Emerging epidemic of hepatitis C virus infections among young nonurban persons who inject drugs in the United States, 2006–2012. *Clinical Infectious Diseases*. 2014;59(10):1411–1419.

¹⁵⁹ Suryaprasad AG, White JZ, Xu F, Eichler B-A, Hamilton J, Patel A, et al. Emerging epidemic of hepatitis C virus infections among young nonurban persons who inject drugs in the United States, 2006–2012. *Clinical Infectious Diseases*. 2014;59(10):1411–1419; McDonald DC, Carlson K, Izrael D. Geographic variation in opioid prescribing in the US. *The journal of Pain*. 2012;13(10):988–996; Zibbell JE, Asher AK, Patel RC, Kupronis B, Iqbal K, Ward JW, et al. Increases in acute hepatitis C virus infection related to a growing opioid epidemic and associated injection drug use, United States, 2004 to 2014. *American journal of public health*. 2018;108(2):175–181.

¹⁶⁰ Mars S, Bourgois P, Karandinos G, Montero F, Ciccarone D. "Every 'Never' I Ever Said Came True": Transitions from opioid pills to heroin injecting. *Int J Drug Policy*. 2014 Mar;25(2):257-66. doi: 10.1016/j.drugpo.2013.10.004. Epub 2013 Oct 19. [PMID: 24238956].

¹⁶¹ Centers for Disease Control and Prevention, Viral Hepatitis Surveillance United States, 2017. 2019, Centers for Disease Control and Prevention.

¹⁶² Ciccarone, D., Bamberger, J., Kral, A., Hobart, C. J., Moon, A., Edlin, B. R., et al. (2001). Soft tissue infections among injection drug users – San Francisco, California, 1996–2000. *Journal of the American Medical Association*, 285(21), 2707–2709. Ebright, J. B. P. (2002). Skin and soft tissue infections in injection drug users. *Infectious Disease Clinics of North America*, 16(3), 697–712.

¹⁶³ Frontera JA, Gralon JD. Right-sided endocarditis in injection drug users: review of proposed mechanisms of pathogenesis. *Clin Infect Dis* 2000; 30:374–9.

SSTI are highly prevalent in populations of PWID. Rates of SSTI have doubled during the time period from early in wave one to mid wave two of the opioid crisis and skewed towards younger populations.¹⁶⁴

F. Potential Treatment Options

64. The triple wave opioid epidemic is a crisis; in its wake lay millions addicted to opioids, nearly half a million overdose deaths over 20 years,¹⁶⁵ and rising rates of HCV, HIV and other infectious conditions. Action is needed to counter these harms by expanding substance use treatment services, overdose prevention technologies and services, and HCV/HIV prevention, surveillance and treatment services. We will need to think big in terms of abatement remedies as we recognize that millions have developed OUD during this era of excess supply of prescription opioids. (See paragraph 48 above.)

- a. Abatement of the opioid crisis and its consequences will require long-term commitments. Policies to reduce excess opioid supply, e.g., through prescribing guidelines and PDMPs, while successful in reducing opioid volumes, have had a lagged effect on reduction of prescription opioid overdose. Expansion of services, including workforce development, to meet the needs of an expanding population of

¹⁶⁴ Ciccarone, D., et al., Nationwide increase in hospitalizations for heroin-related soft tissue infections: Associations with structural market conditions. *Drug Alcohol Depend.* (2016), <http://dx.doi.org/10.1016/j.drugalcdep.2016.04.009>.

¹⁶⁵ This figure obtained by adding annual figures for deaths due to opioids from 1999 through 2018 (Hedegaard H, Miniño AM, Warner M. Drug overdose deaths in the United States, 1999–2018. NCHS Data Brief, no 356. Hyattsville, MD: National Center for Health Statistics. 2020.) with provisional overdose deaths for 2019 through November 2019 (<https://www.cdc.gov/nchs/nvss/vsrr/drug-overdose-data.htm>) (accessed June 29, 2020).

persons with OUD, or persons living with HIV/HCV will take time.¹⁶⁶ OUD is a chronic relapsing condition that for some, requires lifelong care.¹⁶⁷ HIV treatment is typically lifelong.¹⁶⁸

- b. The funding needs for abatement of the opioid crisis will be quite large. I, along with Josh Katz of *The New York Times*, estimated that federal and state funding of the order of \$100 billion is needed for a comprehensive approach to prevention and treatment nationwide.¹⁶⁹ I worked with Mr. Katz to design the survey logistics and questionnaire for a survey of 30 national experts on the opioid epidemic on how this money could be allocated to address the consequences of the opioid crisis. This \$100 billion figure and proportional allocation has been incorporated into national legislative and political campaign proposals.
- c. Moving beyond national perspectives, it is crucial that abatement approaches be tailored to local needs, politics and circumstances. Dr. Alexander in his report urges local comprehensive needs assessments and involvement of local

¹⁶⁶ National Academies of Sciences, Engineering, and Medicine 2020. Opportunities to Improve Opioid Use Disorder and Infectious Disease Services: Integrating Responses to a Dual Epidemic. Washington, DC: The National Academies Press. <https://doi.org/10.17226/25626>.

¹⁶⁷ Expert Report of Anna Lembke, M.D., *Cabell County Commission and City of Huntington, West Virginia v. AmerisourceBergen Drug Corp., et al.*, No. 1:17-op-45053-SAP and No. 1:17-op-45054.

¹⁶⁸ Tomas Cihlar and Marshall Fordyce. Current status and prospects of HIV treatment. *Current Opinion in Virology* 2016, 18:50–56

¹⁶⁹ Josh Katz, *How a Police Chief, a Governor and a Sociologist Would Spend \$100 Billion to Solve the Opioid Crisis*, *The New York Times* (Feb. 14, 2018), <https://www.nytimes.com/interactive/2018/02/14/upshot/opioid-crisis-solutions.html>.

stakeholders.¹⁷⁰ I was involved, as a consultant (based on the experience with the NYT), in such a process for the Colorado Health Institute, in partnership with the Colorado Consortium for Prescription Drug Abuse Prevention, on their Colorado Opioid Crisis Response Blueprint: A Guide for Opioid Settlement Investments.¹⁷¹ As a consultant for this project, I helped design the survey methods and questions. Colorado experts that were surveyed recommended a comprehensive plan of treatment and prevention, including using the largest portion of the opioid settlement money to expand treatment, particularly in rural areas.

65. OUD has a number of medical treatment options that have been shown to be medically effective and cost-effective. Dr. Lembke's report is an excellent resource on the need to expand infrastructure for treating addiction, using evidenced based medications, and utilizing a chronic-care model along with team-based approaches and "centers of excellence" to treat OUD.¹⁷²

a. The US Food and Drug Administration has approved three medications, which have strong medical evidence bases, for the treatment of OUD. These medication assisted therapies (MAT) include buprenorphine, methadone and extended release naltrexone. Use of these medications, especially buprenorphine and methadone, which have the greatest evidence base, have been shown to improve

¹⁷⁰ Expert Witness Report of G. Caleb Alexander, MD, MS, *Cabell County Commission and City of Huntington, West Virginia v. AmerisourceBergen Drug Corp., et al.*, No. 1:17-op-45053-SAP and No. 1:17-op-45054.

¹⁷¹ Colorado Opioid Crisis Response Blueprint: A Guide for Opioid Settlement Investments. Colorado Health institute. Dec 2019. <https://www.coloradohealthinstitute.org/research/colorado-opioid-crisis-response-blueprint> (accessed June 29, 2020).

¹⁷² Expert Report of Anna Lembke, M.D., *Cabell County Commission and City of Huntington, West Virginia v. AmerisourceBergen Drug Corp., et al.*, No. 1:17-op-45053-SAP and No. 1:17-op-45054.

neuroadaptation and physical and social functioning, increase retention in treatment, as well as reduce harms: decrease illicit opioid use, all-cause mortality, including overdose, HIV/HCV transmission, as well as reduce criminal activity.¹⁷³

Despite these benefits, and numerous endorsements, e.g., from American Society of Addiction Medicine, the US Substance Abuse and Mental Health Services Administration, and the World Health Organization, these medications are underutilized with only approximately 20% accessing this lifesaving care.¹⁷⁴

- b. West Virginia is under-resourced for providing MAT. There are only nine opioid treatment programs in West Virginia, representing a mere 0.7% of the US total.¹⁷⁵ These nine clinics can serve approximately 5,400 patients. This is just a fraction of the need considering the state's number one rank nationwide in opioid overdose. A reasonable estimate for persons living with OUD in the state would be 48,000; for Cabell County, the estimate would be 7,000.¹⁷⁶ A recent state report calls for

¹⁷³ Volkow ND, Frieden TR, Hyde PS, Cha SS. Medication-Assisted Therapies — Tackling the Opioid-Overdose Epidemic. *N Engl J Med.* 2014;370:2063-2066.

¹⁷⁴ Saloner B, Karthikeyan S. Changes in substance abuse treatment use among individuals with opioid use disorders in the United States, 2004-2013. *JAMA* 2015; 314:1515-7. Smith SM, Huang B, Hasin DS. Nonmedical prescription opioid use and DSM-5 nonmedical prescription opioid use disorder in the United States. *The Journal of clinical psychiatry.* 2016;77:772-780.

¹⁷⁵ 2017 State Profile — West Virginia National Survey of Substance Abuse Treatment Services (N-SSATS) Available at: <https://wwwdasis.samhsa.gov/> (accessed June 30, 2020).

¹⁷⁶ Estimated number of persons with OUD in West Virginia: 1,830,000 (population of WV in 2016) x 0.8% (national estimate for proportion living with OUD; see paragraph 48.a above) = 14,640; given the state's opioid overdose rate is 3.3 times the national average (2016: US: 13.3, WV: 43.4/100,000 (Seth P, Scholl L, Rudd RA, Bacon S. Overdose Deaths Involving Opioids, Cocaine, and Psychostimulants — United States, 2015–2016. *MMWR Morb Mortal Wkly Rep.* 2018 Mar 30;67(12):349–58): 14,640 x 3.3 = 48,312. Given that the national estimate is based on household survey data, the number could be much larger, even twice as large. For Cabell County,

the expansion of screening for substance use disorders and availability of MAT; to expand points of access to substance use disorder treatment and timely and effective transitions from one treatment setting to another; expand mobile treatment options and integration of tele-medicine; and address stigma related to OUD treatment, e.g., by educating legislators, community leaders, and providers on the evidence-base and need for on-demand treatment.¹⁷⁷

- c. Addiction and drug use carry enormous societal stigma leading to marginalization of the affected population and creating barriers to effective screening, prevention and treatment. OUD is seen by medicine as a brain disease, yet the societal lens of stigma puts inordinate blame on the individual for poor choices or moral failing; the language we use causes internalized shame and poor self-regard and -care. In addition, treatment for substance use disorders is typically marginalized away from mainstream medicine. To counter this we need education for the public, policy makers and media on the need for nonjudgmental language to describe this disorder,¹⁷⁸ the effectiveness of medical treatments (as opposed to a common but

the following data for 2016 was used: population 95,681 x .008 x 9.3 (ratio of county to US OD death rates) = 7,119.

¹⁷⁷ West Virginia 2020-2022 Substance Use Response Plan. Governor's Council on Substance Abuse Prevention and Treatment. January 20, 2020. WV Department of Health and Human Resources. Office of Drug Control Policy. https://www.wvlegislature.gov/legisdocs/reports/agency/H01_FY_2020_14683.pdf.

¹⁷⁸ Changing the Language of Addiction Michael P. Botticelli, MEd; Howard K. Koh, MD, MPH JAMA. 2016;316(13):1361-1362. doi:10.1001/jama.2016.11874.

false notion of “substituting one opioid for another”); and the promotion of comprehensive and integrated health services for treating OUD.¹⁷⁹

- d. Given the overall low access to and uptake of treatment, an OUD care cascade has been developed to help improve system level practice and treatment outcomes.¹⁸⁰ Similar to the HIV treatment cascade and care continuum,¹⁸¹ the goal is to understand gaps in each step of care, e.g., access, engagement, retention and clinical improvement. Williams et al. identified severe gaps in the OUD care continuum including low levels of engagement in care, uptake of MAT, retention past 6 months and remission.¹⁸²

66. There is a workforce crisis for behavioral health care in general and substance use treatment specifically.¹⁸³ This crisis is both in numbers of care providers and inequitable distribution. For example, under 4 percent of physicians are authorized to provide buprenorphine

¹⁷⁹ Olsen Y, Sharfstein JM. Confronting the stigma of opioid use disorder – and its treatment. JAMA. 2014;311:1393-1394.

¹⁸⁰ Arthur Robin Williams, Edward V. Nunes, Adam Bisaga, Frances R. Levin, and Mark Olfson. Development of a Cascade of Care for responding to the opioid epidemic. The American Journal of Drug and Alcohol Abuse 2019, Vol. 45, No. 1, 1–10 <https://doi.org/10.1080/00952990.2018.1546862>.

¹⁸¹ Kay, E.S., Batey, D.S. & Mugavero, M.J. The HIV treatment cascade and care continuum: updates, goals, and recommendations for the future. AIDS Res Ther 13, 35 (2016). <https://doi.org/10.1186/s12981-016-0120-0>.

¹⁸² Arthur Robin Williams, Edward V. Nunes, Adam Bisaga, Frances R. Levin, and Mark Olfson. Development of a Cascade of Care for responding to the opioid epidemic. The American Journal of Drug and Alcohol Abuse 2019, Vol. 45, No. 1, 1–10 <https://doi.org/10.1080/00952990.2018.1546862>.

¹⁸³ Beck AJ, Manderscheid MW, Buerhaus PI. The Behavioral Health Workforce: Planning, Practice and Preparation. American Journal of Preventive Medicine. 2018;54:S187-S296.

treatment¹⁸⁴ and those who are authorized underutilize it.¹⁸⁵ Additional barriers include training and education deficits, poor support from institutions, and a lack of coordination of care across service providers.¹⁸⁶ Workforce expansion to improve access to OUD will require increased training across the medical doctor career span (i.e., students, residents, and physicians, e.g., with continuing medical education) and including allied medical professionals such as nurse practitioners and physician assistants.

a. The shortage of providers who can address substance use disorder in rural areas is particularly acute.¹⁸⁷ For example, 72 percent of rural counties do not have a Drug Addiction Treatment Act (DATA)-waived physician, i.e., those authorized to prescribe buprenorphine, despite opioid overdose rates similar to those in urban areas. Recommendations include incentivizing physicians and allied health professionals, e.g., through loan forgiveness, to work in rural health care and expanding the use of telemedicine for OUD.

¹⁸⁴ Haffajee R., Bohnert AS, and Lagisetty PA. 2018. Policy pathways to address provider workforce barriers to buprenorphine treatment. *American Journal of Preventive Medicine* 54(6):S230–S242.

¹⁸⁵ Stein BD., Sorbero M, Dick AW, Pacula RL, Burns RM, and Gordon AJ. 2016. Physician capacity to treat opioid use disorder with buprenorphine-assisted treatment. *Journal of the American Medical Association* 316(11):1211–1212.

¹⁸⁶ Haffajee R., Bohnert AS, and Lagisetty PA. Lagisetty. 2018. Policy pathways to address provider workforce barriers to buprenorphine treatment. *American Journal of Preventive Medicine* 54(6):S230–S242.

¹⁸⁷ National Academies of Sciences, Engineering, and Medicine. Opportunities to Improve Opioid Use Disorder and Infectious Disease Services: Integrating Responses to a Dual Epidemic. Washington, DC: The National Academies Press. <https://doi.org/10.17226/25626>.

- b. There is a renewed and urgent need for better integration of care between medical and substance treatment providers and facilities.¹⁸⁸ Expansion of the primary care workforce that can prescribe buprenorphine is a crucial and ongoing strategy.¹⁸⁹ Expansion of the hub and spoke model – in which intake for a large geographic catchment (hub) begins specialized treatment and then refers patients to primary care (spoke) for continuity care – is a key strategy.¹⁹⁰
- c. Workforce development should begin at the student level.¹⁹¹ For the past two years, I have been a member of the Opioid Working Group at the University of California (UC) whose ongoing work is developing curricula on treating pain, including the appropriate use of opioids, and addressing substance use disorders to be used at all six UC medical schools. One specific goal of this group is to have all graduating UC medical students trained sufficiently on OUD and treatment to then acquire the DATA waiver to prescribe buprenorphine when waiver-eligible. This process has been achieved at a single medical school.¹⁹²

¹⁸⁸ National Academies of Sciences, Engineering, and Medicine 2020. Opportunities to Improve Opioid Use Disorder and Infectious Disease Services: Integrating Responses to a Dual Epidemic. Washington, DC: The National Academies Press. <https://doi.org/10.17226/25626>.

¹⁸⁹ Wakeman SE and Barnett ml. 2018. Primary care and the opioid-overdose crisis—buprenorphine myths and realities. New England Journal of Medicine 379(1):1–4.

¹⁹⁰ Williams AR and Bisaga A. 2016. From AIDS to opioids—how to combat an epidemic. New England Journal of Medicine 375(9):813–815.

¹⁹¹ National Academies of Sciences, Engineering, and Medicine. Opportunities to Improve Opioid Use Disorder and Infectious Disease Services: Integrating Responses to a Dual Epidemic. Washington, DC: The National Academies Press. <https://doi.org/10.17226/25626>.

¹⁹² Access to treatment for opioid use disorders: Medical student preparation, Elinore F. McCance-Katz MD, PhD Paul George MD, MHPE Nicole Alexander Scott MD, MPH Richard

67. Overdose prevention interventions to address the fentanyl-meets-heroin wave of the opioid epidemic need creative expansion.¹⁹³ I have summed up the necessary interventions in two recent editorials.¹⁹⁴ Promotion of community-based overdose prevention programs, including peer-distribution of naloxone, is ongoing.¹⁹⁵ The US Surgeon General, Dr. Jerome Adams, has released a public health advisory – for the first time in more than a decade – addressing the crisis of opioid overdose deaths and citing the effectiveness of naloxone in reducing those deaths.¹⁹⁶ Community distribution of naloxone, including to law enforcement, has increased in West Virginia, but much more is needed.¹⁹⁷

Dollase EDD Allan R. Tunkel MD, PhD James McDonald MD, MPH, The American Journal on Addictions, 2017. <https://doi.org/10.1111/ajad.12550>.

¹⁹³ Ciccarone D. Fentanyl in the US heroin supply: A rapidly changing risk environment. *Int J Drug Policy*. 2017 08; 46:107-111. PMID: 28735776. PMCID: PMC5742018.

¹⁹⁴ Ciccarone D. Fentanyl in the US heroin supply: A rapidly changing risk environment. *Int J Drug Policy*. 2017 08; 46:107-111. PMID: 28735776. PMCID: PMC5742018; Ciccarone D. The triple wave epidemic: Supply and demand drivers of the US opioid overdose crisis. *Int J Drug Policy*. 2019 Feb 01. PMID: 30718120.

¹⁹⁵ Fairbairn, N., Coffin, P.O., & Walley, A.Y. (2017). Naloxone for heroin, prescription opioid, and illicitly made fentanyl overdoses: Challenges and innovations responding to a dynamic epidemic. *International Journal of Drug Policy*, 46, 172–179. <http://dx.doi.org/10.1016/j.drugpo.2017.06.005>.

¹⁹⁶ Adams JM. Increasing Naloxone Awareness and Use: The Role of Health Care Practitioners. *JAMA*. 2018;319(20):2073–2074. doi:10.1001/jama.2018.4867 Office of the Surgeon General; US Department of Health and Human Services. Surgeon General’s Advisory on Naloxone and Opioid Overdose. <http://www.surgeongeneral.gov> (accessed June 30, 2020).

¹⁹⁷ West Virginia 2020-2022 Substance Use Response Plan. Governor’s Council on Substance Abuse Prevention and Treatment. January 20, 2020. WV Department of Health and Human Resources. Office of Drug Control Policy. https://www.wvlegislature.gov/legisdocs/reports/agency/H01_FY_2020_14683.pdf.

- a. The challenges in the synthetic opioid era include erratic drug potency, magnified when potent opioids are combined in use, e.g., FASH.¹⁹⁸ Toxicological surveillance of the evolving palette of synthetic opioids in the marketplace is challenging. Resources are needed to centralize medical examiner systems, promote standardized procedures regarding investigating deaths, and use of more advanced analytic testing.¹⁹⁹
- b. Surveillance also includes understanding the vicissitudes in the drug stream and how they adversely affect the population at risk; my team has published such an analysis²⁰⁰ as a proof of concept for an “early warning system.” Analysis of drug samples and dissemination of the findings could be achieved in rapid cycles and enhance our understanding of the drugs in circulation and especially how rapidly heroin, FASH and fentanyl analogue mixtures are changing. Improved surveillance would benefit not only the interdiction and public safety side but also the public health side including first responders, emergency and hospital clinicians as well as those who work in community based programs serving the affected population.²⁰¹

¹⁹⁸ Ciccarone, D., Ondocsin, J., & Mars, S. G. (2017). Heroin uncertainties: Exploring users' perceptions of fentanyl-adulterated and -substituted 'heroin'. International Journal of Drug Policy, 46, 146–155. <http://dx.doi.org/10.1016/j.drugpo.2017.06.004>.

¹⁹⁹ Lucyk, S.N. & Nelson, L.S. (2017). Toxicosurveillance in the US Opioid Epidemic. International Journal of Drug Policy, 46, 168–171. <http://dx.doi.org/10.1016/j.drugpo.2017.05.057>

²⁰⁰ Daniel Rosenblum, Jay Unick & Daniel Ciccarone, The Rapidly Changing US Illicit Drug Market and the Potential for an Improved Early Warning System: Evidence from Ohio Drug Crime Labs, Drug and Alcohol Dependence Volume 208, 1 March 2020, 107779

²⁰¹ Ciccarone D. The triple wave epidemic: Supply and demand drivers of the US opioid overdose crisis. Int J Drug Policy. 2019 Feb 01. PMID: 30718120.

Point of use testing or “drug checking” is an intimate form of surveillance that is emergent in the US because of the FASH crisis.

- c. Harm reduction programs have long championed naloxone distribution.²⁰² Newer creative interventions being implemented include point-of-use testing or “drug checking” to inform and engage persons who consume drugs as well as provide a potential surveillance platform.²⁰³ Rapid testing has a growing evidence base to support its effectiveness.²⁰⁴
- d. Supervised injection facilities have a strong international evidence base regarding reduction in harms and bridging to substance treatment and clinical services.²⁰⁵ The InSite program in Vancouver, Canada has been successful in reducing population level fatal overdose.²⁰⁶ Supervised injection facilities make sense in addressing the

²⁰² Seal, Karen H. et al. 2005. Naloxone distribution and cardiopulmonary resuscitation training for injection drug users to prevent heroin overdose death: A pilot intervention study. *J Urban Health* 2005 Jun; 82(2): 303-311. PMCID: PMC2570543.

²⁰³ Hondebrink, L., Nugteren-van Lonkhuyzen, J.J., Van Der Gouwe, D., & Brunt, T.M. (2015). Monitoring new psychoactive substances (NPS) in The Netherlands: Data from the drug market and the Poisons Information Centre. *Drug and Alcohol Dependence*, 147, 109–115. Gilbert, M. K., & Dasgupta, N. (2017). Silicon to syringe: Cryptomarkets and disruptive innovation in opioid supply chains. *International Journal of Drug Policy*, 46, 160–167. <http://dx.doi.org/10.1016/j.drugpo.2017.05.052>.

²⁰⁴ Peiper, N.C., Clarke, S.D., Vincent, L.B., Ciccarone, D., Kral, A.H., & Zibbell, J.E. (2018). Fentanyl test strips as an opioid overdose prevention strategy: Findings from a syringe services program in the Southeastern United States. *The International Journal of Drug Policy*. <https://doi.org/10.1016/j.drugpo.2018.08.007>.

²⁰⁵ Potier, C., Laprévote, V., Dubois-Arber, F., Cottencin, O., & Rolland, B. (2014). Supervised injection services: What has been demonstrated? A systematic literature review. *Drug and Alcohol Dependence*, 145, 48–68.

²⁰⁶ Marshall, B.D., Milloy, M.J., Wood, E., Montaner, J.S., & Kerr, T. (2011). Reduction in overdose mortality after the opening of North America’s first medically supervised safer injecting facility: A retrospective population-based study. *The Lancet*, 377(9775), 1429–1437.

fentanyl overdose epidemic given that fentanyl overdose is a rapid event with a narrow therapeutic window.²⁰⁷ No facility exists yet in the United States, however the path has been legally cleared.²⁰⁸

68. The rise in HCV nationally, along with geographic clusters of HIV, among PWID (see sections 61 and 62 above) requires greater attention to the prevention, surveillance and treatment of these blood transmitted viruses. Prevention is fairly straightforward: sterile syringe provision must be greatly expanded to meet the increasing population at risk. The provision of sterile syringes is associated with reductions in risky behaviors,²⁰⁹ HIV²¹⁰ and HCV.²¹¹ The CDC, as well as other governmental agencies, call syringe services programs safe and effective.²¹² US Health and Human Services Assistant Secretary for Health, Admiral Brett Giroir, in a commentary

²⁰⁷ Green, T.C., & Gilbert, M. (2016). Counterfeit medications and fentanyl. *JAMA Internal Medicine*, 176(10), 1555–1557. Somerville, N.J., O'Donnell, J., Gladden, R.M., Zibbell, J.E., Green, T.C., Younkin, S., et al. (2017). Characteristics of fentanyl overdose—Massachusetts, 2014–2016. *MMWR Morbidity and Mortality Weekly Report*, 66, 382–386. <http://dx.doi.org/10.15585/mmwr.mm6614a2>.

²⁰⁸ Eric Levenson and Lauren del Valle, *Judge clears path for Philadelphia nonprofit to open safe-injection site to combat overdoses*, CNN (updated 2:22 PM ET, Wed Feb. 26, 2020), <https://www.cnn.com/2020/02/26/us/philadelphia-supervised-injection-site/index.html>. (accessed June 30, 2020).

²⁰⁹ Bluthenthal RN, Kral AH, Gee L, Erringer EA, Edlin BR. The effect of syringe exchange use on high-risk injection drug users: a cohort study. *AIDS* 2000;14:605–611.

²¹⁰ Des Jarlais DC, Marmor M, Paone D. HIV incidence among injecting drug users in New York City syringe exchange programs. *Lancet*. 1996;348:987–991.

²¹¹ Hagan H, Des Jarlais DC, Friedman SR, Purchase D, Amaro H. Reduced risk of hepatitis B and hepatitis C among injection drug users in the Tacoma syringe exchange program. *Am J Public Health* 1995;85:1531–1537.

²¹² Syringe Services Programs. US Centers for Disease Control and Prevention. <https://www.cdc.gov/hiv/effective-interventions/respond/syringe-services-programs/index.html> (accessed June 30, 2020).

addressing how to “end the HIV epidemic,” called syringe services programs a “proven prevention intervention.”²¹³

- a. Risky syringe sharing behaviors are still common among PWID in West Virginia.²¹⁴ While syringe services programs have been implemented over the past three years and have expanded statewide, the recent closure on a large program in Charleston, West Virginia has worrisome implications²¹⁵ and goes against recent recommendations to promote harm reduction throughout the state.²¹⁶
- b. Harm reduction programs can serve as a point of entry to comprehensive services including substance use treatment as well as clinical treatment for HCV/HIV. A recent consensus study report from NASEM, *Opportunities to Improve Opioid Use Disorder and Infectious Disease Services: Integrating Responses to a Dual Epidemic*, called for “Integration” and “Co-Location” of prevention and clinical treatment services for OUD and infectious diseases.²¹⁷

²¹³ Brett P. Giroir, 2020: The Time Is Now to End the HIV Epidemic American Journal of Public Health 110, 22_24, <https://doi.org/10.2105/AJPH.2019.305380>.

²¹⁴ Allen, S.T., Grieb, S.M., O’Rourke, A. et al. Understanding the public health consequences of suspending a rural syringe services program: a qualitative study of the experiences of people who inject drugs. Harm Reduct J 16, 33 (2019). <https://doi.org/10.1186/s12954-019-0305-7>.

²¹⁵ Allen, S.T., Grieb, S.M., O’Rourke, A. et al. Understanding the public health consequences of suspending a rural syringe services program: a qualitative study of the experiences of people who inject drugs. Harm Reduct J 16, 33 (2019). <https://doi.org/10.1186/s12954-019-0305-7>.

²¹⁶ West Virginia 2020-2022 Substance Use Response Plan. Governor’s Council on Substance Abuse Prevention and Treatment. January 20, 2020. WV Department of Health and Human Resources. Office of Drug Control Policy. https://www.wvlegislature.gov/legisdocs/reports/agency/H01_FY_2020_14683.pdf.

²¹⁷ National Academies of Sciences, Engineering, and Medicine. Opportunities to Improve Opioid Use Disorder and Infectious Disease Services: Integrating Responses to a Dual Epidemic. Washington, DC: The National Academies Press. <https://doi.org/10.17226/25626>.

- c. Combining scaled-up HCV treatment along with prevention (e.g., syringe services) and OUD treatment (e.g., medical assisted therapy) interventions was shown in a rural model to decrease the burden of HCV incidence and prevalence by 90% in a rural model.²¹⁸
- d. The West Virginia 2020-2022 Substance Use Response Plan calls for increased screening and rapid access to treatment of infectious diseases associated with substance use disorders.²¹⁹
- e. Pre-exposure prophylaxis (aka PreP) is considered a proven strategy for reducing HIV transmission²²⁰ and is recommended by the CDC for use in populations of PWID.²²¹

V. CONCLUSION

The State of West Virginia and the Cabell-Huntington community have suffered disproportionately severe impacts from the prescription opioid epidemic and the waves of heroin and illicit fentanyl that followed. Substantial effort and expense will be required to mitigate the harms from this triple wave epidemic.

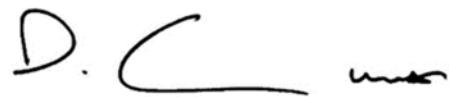
²¹⁸ Scaling-up HCV prevention and treatment interventions in rural United States—model projections for tackling an increasing epidemic Hannah Fraser, Jon Zibbell, et al Addiction, First published: 22 July 2017 <https://doi.org/10.1111/add.13948>.

²¹⁹ West Virginia 2020-2022 Substance Use Response Plan. Governor's Council on Substance Abuse Prevention and Treatment. January 20, 2020. WV Department of Health and Human Resources. Office of Drug Control Policy. https://www.wvlegislature.gov/legisdocs/reports/agency/H01_FY_2020_14683.pdf.

²²⁰ Brett P. Giroir, 2020: The Time Is Now to End the HIV Epidemic American Journal of Public Health 110, 22_24, <https://doi.org/10.2105/AJPH.2019.305380>.

²²¹ <https://www.cdc.gov/hiv/effective-interventions/prevent/prep/index.html> (accessed June 30, 2020).

Pursuant to 28 U.S.C. § 1746, I declare under penalty of perjury that the foregoing is true and correct.

A handwritten signature in black ink, appearing to read "D. Ciccarone".

Dated: August 3, 2020

Daniel Ciccarone, MD, MPH

Exhibit A

Prepared: August 3, 2020

University of California, San Francisco
CURRICULUM VITAE

Name: Daniel H Ciccarone, MD

Position: Professor of Clinical Family & Community Medicine, Step 4
 Family & Community Medicine
 School of Medicine

Professor of Family and Community Medicine

Address: Box 0900
 500 Parnassus Avenue, MU, 306E
 University of California, San Francisco
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 Voice: 415-514-0275
 Fax: 415-476-6051
 Email: daniel.ciccarone@ucsf.edu
 Web: <http://profiles.ucsf.edu/daniel.ciccarone>

EDUCATION

1978 - 1983	State University of New York	B.S.	Biology/Social Sciences
1983 - 1987	State University of New York	M.D.	Medicine
1989 - 1992	Family Practice Residency Program, University of California, San Francisco	Resident	Family and Community Medicine
1997 - 1998	University of California, Berkeley	M.P.H.	Epidemiology
1997 - 2000	UCSF/UCB Joint Residency Program in General Preventive Medicine and Public Health	Resident	Preventive Medicine
1997 - 2000	Center for AIDS Prevention Studies, University of California, San Francisco	Fellow	HIV Prevention
1998 - 2000	Department of Family and Community Medicine, University of California, San Francisco	Fellow	Family Medicine Research

LICENSES, CERTIFICATION

1992	Medical Board of California; (G071090)
1992	Board Certified, American Board of Family Practice
1999	Board re-certification, American Board of Family Practice
2003	Board Certified, American Board of Preventive Medicine

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2006	Board re-certification, American Board of Family Practice
2016	Board re-certification, American Board of Family Practice
2018	Board Certified, American Board of Preventive Medicine, sub-Board Addiction Medicine

PRINCIPAL POSITIONS HELD

1997 - 2000	University of California, San Francisco School of Medicine	Assistant Clinical Professor, WOS
2000 - 2006	University of California, San Francisco School of Medicine	Assistant Professor
2006 - 2012	University of California, San Francisco School of Medicine	Associate Professor of Clinical Family and Community Medicine
2009 - 2016	University of California, San Francisco School of Medicine	Co-Director, Foundations of Patient Care Course
2009 - 2017	University of California, San Francisco School of Medicine	Director, Transitional Clerkship
2012 - present	University of California, San Francisco School of Medicine	Professor of Clinical Family and Community Medicine

OTHER POSITIONS HELD CONCURRENTLY

1992 - 1995	Family Medical Clinics of the Peninsula	Physician
1992 - 1995	Industrial Medical Services	Physician
1994 - 1995	Univ. Health Service at UC Berkeley	Physician
1995 - 1996	St. Anthony Clinic	Physician
1995 - 1998	South of Market Health Center	Physician
1997 - 1998	Berkeley Women's Clinic	Physician
1999 - 2000	Tom Waddell Clinic	Physician
2001 - 2011	West Berkeley Family Medicine Clinic	Physician
2011 - 2012	UCSF Family Medicine Center at Lakeshore	Physician
2012 - 2015	One Medical Group	Physician

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2018 - Recovery Without Walls Physician

HONORS AND AWARDS

1996	Best Small Group Facilitator, Nomination	University of California, San Francisco School of Medicine
1997	Physician's Recognition Award	American Medical Association
2000	Physician's Recognition Award	American Medical Association
2002	Best Small Group Facilitator, Nomination	University of California, San Francisco School of Medicine
2003	UCSF Academic Senate Distinction in Teaching Award, Nomination	University of California, San Francisco School of Medicine
2003	Outstanding Lecture Series (John Danovic Case, organized by Dr. Alan Gelb), Nomination	University of California, San Francisco School of Medicine
2003	Physician's Recognition Award	American Medical Association
2004	Innovations grant from UCSF Academy of Medical Educators	University of California, San Francisco School of Medicine
2004	Outstanding Lecture Series (John Danovic Case, organized by Dr. Alan Gelb), Nomination	University of California, San Francisco School of Medicine
2004	Excellence in Small Group Teaching, Nomination	University of California, San Francisco School of Medicine
2004	George S. Sarlo Award for Teaching Excellence (HIV/AIDS), Nomination	University of California, San Francisco School of Medicine
2005	Member, UCSF Academy of Medical Educators	University of California, San Francisco School of Medicine
2006	Physician's Recognition Award with Commendation	American Medical Association
2006	Essential Core Teaching AWARD, Outstanding FPC Facilitator	University of California, San Francisco School of Medicine
2006	Essential Core Teaching Award, Inspirational Teacher (class of '09), Nomination	University of California, San Francisco School of Medicine
2006	Kaiser Award for Excellence in Teaching, Nomination	University of California, San Francisco School of Medicine
2006	Essential Core Teaching Award, Commitment to Teaching (class of '08), Nomination	University of California, San Francisco School of Medicine

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2006	Essential Core Teaching Award, Inspirational Teacher (class of '08), Nomination	University of California, San Francisco School of Medicine
2006	Essential Core Teaching Award, Innovative Teaching, Nomination	University of California, San Francisco School of Medicine
2006	Essential Core Teaching Award, Commitment to Teaching (class of '09), Nomination	University of California, San Francisco School of Medicine
2006	Essential Core Teaching Award, Excellence in Small Group Instruction, Nomination	University of California, San Francisco School of Medicine
2007	Fellow Elect	The Society for Applied Anthropology
2007	Essential Core Teaching Award, Inspirational Teacher, Nomination	University of California, San Francisco School of Medicine
2007	Essential Core Teaching Award, Outstanding FPC Preceptor, Nomination	University of California, San Francisco School of Medicine
2007	Essential Core Teaching Award, Excellence in Small Group Instruction, Nomination	University of California, San Francisco School of Medicine
2007	Essential Core Teaching Award, Commitment to Teaching, Nomination	University of California, San Francisco School of Medicine
2008	Essential Core Teaching Award, Outstanding Contribution to an Elective (Class of 2010), Nomination	University of California, San Francisco School of Medicine
2008	Kaiser Award for Excellence in Teaching, Nomination	University of California, San Francisco School of Medicine
2009	Essential Core Teaching AWARD, Outstanding Lecture (class of 2011)	University of California, San Francisco School of Medicine
2010	Kaiser Award for Excellence in Teaching, classroom setting, Nomination	University of California, San Francisco School of Medicine
2012	Finalist for BEST ABSTRACT: "National Demographic Trends in Hospitalizations for Heroin- and Opioid-Related Overdoses, 1993-2009,"	AMERSA 36th National Conference, Bethesda, MD
2012	Essential Core Teaching Award: Inspirational Teacher, Nomination	University of California, San Francisco School of Medicine
2013	Associate Editor	International Journal of Drug Policy

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2014	UCSF Chancellor's Advisory Committee on Sustainability: Annual Sustainability Faculty AWARD	University of California, San Francisco
2014	Essential Core Teaching Award: Inspirational Teacher, Nomination	University of California, San Francisco School of Medicine
2014	Kaiser Award for Excellence in Teaching, classroom setting, Nomination	University of California, San Francisco School of Medicine
2015	Outstanding Reviewer Award	International Journal of Drug Policy
2016	Innovations grant from UCSF Academy of Medical Educators	University of California, San Francisco School of Medicine
2018	Outstanding Reviewer Award	International Journal of Drug Policy
2018	Outstanding Reviewer Award	Drug and Alcohol Dependence
2019	UCSF Chancellor's AWARD for Public Service	University of California, San Francisco

KEYWORDS/AREAS OF INTEREST

Substance-Related Disorders: [and Drug Policy, Economics, Anthropology, Ethnography, Epidemiology, History, Qualitative Research, Mixed-Methods Research, Addiction, Dependence], HIV, Medical Consequences, Soft Tissue Infections, Abscess, Heroin, Black-tar Heroin, Opiates, Opioids, Methamphetamine, Overdose, Public Health, Primary Prevention, Secondary Prevention, Clinic-based Interventions, Community-based Interventions, Homeless Youth, Illicit Drug Markets, Disclosure, Medication Adherence

CLINICAL ACTIVITIES

CLINICAL ACTIVITIES SUMMARY

Since joining the academic faculty in 2000, I have worked .20-.40 FTE in Family Medicine clinical services through independent service agreements with non-UCSF outpatient clinics (except for one academic year at the Family Medicine Center at Lakeshore). In the summer of 2016, I made the decision to transition my clinical efforts from FM/urgent care to Addiction Medicine. In 2016, after re-boarding in FM, I began researching clinical work options in Addiction Medicine. In the fall of 2017, I took the Addiction Medicine Board exam as part of the first wave of AM applicants to the new formal sub-specialty within the American Board of Preventive Medicine. As of 2018, I am board certified in Addiction Medicine and have started clinical work in Addiction Medicine at 0.2 FTE.

CLINICAL SERVICES

1992 - 1995	Family Medical Clinics of the Peninsula	part time
1992 - 1995	Industrial Medical Services	part time
1994 - 1995	Univ. Health Service at UC Berkeley	full time
1995 - 1996	St. Anthony Clinic	full time

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1995 - 1998	South of Market Health Center	part to full time
1997 - 1998	Berkeley Women's Clinic	part time
1999 - 2000	Tom Waddell Clinic	full time
2000 - 2011	West Berkeley Family Medicine Clinic	.20-.40 FTE
2011 - 2012	UCSF Family Medicine Center at Lakeshore	.20 FTE
2012 - 2015	One Medical Group	.20 FTE
2018 -	Recovery Without Walls	.20 FTE

PROFESSIONAL ACTIVITIES

SERVICE TO PROFESSIONAL ORGANIZATIONS

1998 - 2010	American Public Health Association	Member
2002 - 2010	American Anthropological Association	Member
2006 - 2016	Society for Applied Anthropology	Member
2007 - 2016	Society for Applied Anthropology	Fellow
2009 - present	International Doctors for Healthy Drug Policies	Founding Member
2013 - present	International Society for the Study of Drug Policy	Member
2014 - present	Association for Medical Education and Research in Substance Abuse (AMERSA)	Full Member
2018 -	California Society of Addiction Medicine	Member
2018 -	American Society of Addiction Medicine	Member

SERVICE TO PROFESSIONAL PUBLICATIONS

2002 - 2002	The American Journal of Medicine
2004 - 2006	UCSF CAPS/ARI HIV Prevention Fact Sheet, 2 fact sheets
2004 - 2004	Journal of AIDS
2004 - present	International Journal of Drug Policy; Many papers; "Outstanding reviewer – 2015, 2018"
2005 - 2005	Perspectives on Sexual and Reproductive Health
2006 - 2006	Medical Anthropology Quarterly
2008 - 2008	Journal of Studies on Alcohol and Drugs
2008 - present	Journal of Health Care for the Poor and Underserved, 7 papers
2008 - 2010	International AIDS Society; 48 Abstracts- 2008 International AIDS Conference; 40 abstracts in 2010
2008 - present	AIDS and Behavior, four papers

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2008 - present Drug and Alcohol Dependence, five papers; outstanding reviewer award 2018

2009 - 2009 Social Science and Medicine

2009 - 2009 Medical Teacher

2009 - 2009 BMC Public Health

2009 - 2009 Women and Health

2010 - 2010 Journal of Addiction Medicine; Two papers

2010 - 2010 Patient Education and Counseling

2011 - 2011 JAIDS; Six papers for a special issue on HIV/AIDS in Brazil

2011 - 2011 Culture, Medicine and Psychiatry

2011 - 2012 International AIDS Society; Abstract reviewer for the 6th IAS Conference on HIV Pathogenesis, Treatment and Prevention (IAS 2011, 2012)

2011 - 2011 Contemporary Drug Problems

2012 - present International Journal of Drug Policy: Editorial Board Member; 50+ papers; Outstanding Reviewer award 2018

2012 - 2012 Artificial Intelligence in Medicine

2012 - 2012 Substance Abuse

2013 - 2013 The American Journal on Addictions

2013 - 2013 Journal of Psychoactive Drugs

2013 - 2013 Journal of Medical Internet Research

2013 - present International Journal of Drug Policy: Associate Editor: Drug Policy and Economics

2014 - present New England Journal of Medicine; eight papers: 2014, 2015, 2016, 2017, 2018, 2019

2015 - present American Journal of Preventive Medicine: 2015, 2019

2016 - 2016 AMERSA National Conference: abstract reviewer

2017 - present American Journal of Public Health

2018 - Journal of Pharmacoepidemiology and Drug Safety

2018 - Addiction

2018 - Open Forum Infectious Diseases, the open access journal for the Infectious Disease Society of America (IDSA)

2018 - American Family Physician

2018 Book review: *The coming cannabis revolution? Regulatory models for cannabis markets: experiences, scenarios and debates*, Routledge Publishers.

2019 Journal of Substance Abuse Treatment

Prepared: August 3, 2020

2019 The Lancet

INVITED PRESENTATIONS - INTERNATIONAL

2000	Panel Moderator, "Working with Challenging Populations", Fourth International Hepatitis C Virus Conference, San Francisco, CA	
2001	Invited Presentation, "Demystifying the Notion of the 'Difficult-to-Treat Patient'", Fifth International Hepatitis C Virus Conference, San Francisco, CA	
2004	Invited Plenary Presentation with Philippe Bourgois, "Water Works? Implications for Low Threshold HIV Prevention", National Centre in HIV Social Research, Annual Conference, Sydney, Australia	
2009	Invited presentation for a Major Session, Risk Environments and Drug Harms at The International Harm Reduction Conference, Bangkok, Thailand, 20-23 April 2009. My presentation: "Heroin in Brown, Black and White: Geographic Risk Environments in the US Heroin Market."	
2011	Invited presentation: International Panel: "How does National Drug Policy Affect Drug Treatment? The SF perspective." The International Harm Reduction Association 22nd International Conference, Beirut, Lebanon, April 3-7, 2011.	
2015	Harm Reduction panel, Ninth Annual Conference of the International Society for the Study of Drug Policy, Ghent, Belgium, May 20-2, 2015	Chair and Discussant
2016	National Drug Early Warning System, 2nd monthly webinar: Understanding the Relationship Between Prescription Opioid Misuse and Heroin Abuse. Presenters: Daniel Ciccarone, M.D., MPH, University of California San Francisco. Co-presenting with Wilson M. Compton, M.D., M.P.E., Deputy Director of the National Institute on Drug Abuse (NIDA) of the National Institutes of Health. International audience: ~850	Plenary presenter
2017	Invited panel: Harris M, Ciccarone D, Hope V. Drawing attention to neglected injecting-related harms: the case of AA amyloidosis. International Harm Reduction Conference, Montreal May, 2017	Presenter

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2017	Invited talk: Mars S, Ondocsin J, Ciccarone D. Experiences of fentanyl in the United States: A premonition of the future or a geographically specific case study? National Addiction Centre, King's College, London. July 5, 2017	
2017	Invited panel presentation: Drug War Déjà Vu: How Can Harm Reductionists Push Back against Drug Induced Homicide, Harsh Fentanyl Penalties, and the Further Demonization of Drug Users? International Drug Policy Reform Conference 2017. Atlanta, GA. Oct 12, 2017.	Presenter
2017	International news media mentions: • The Guardian UK • World Weekly (London) • Several Latin American papers ; Aftenposten (Norway)	Interviewed expert
2018	Invited panel presentation: Heroin in Transition: multidisciplinary perspectives on the US heroin crisis. Twelfth Annual Conference of the International Society for the Study of Drug Policy, Vancouver, Canada, May, 2018	Organizer, Chair and Discussant
2018	International media: Aftenposten (Norway), twice in 2018; The Star Vancouver; Vancouver Sun; BBC (background)	Interviewed expert
2018	International Doctors for Healthy Drug Policies: quarterly newsletter highlighting The Heroin in Transition project and the opioid crisis in America	Interviewed expert
2019	Invited panel presentation: Exploring Changes in the US 'Heroin' Risk Environment: HIV, Drug Supply, Polysubstance Use and Overdose. 13 th Annual Conference of the International Society for the Study of Drug Policy, Paris, France, May, 2019	Organizer, Chair and Discussant
2019	International news media mentions: Canadian PBS; Xinhua News Agency (Chinese); Global Vicens; Globe post UK, Australian TV; CBC radio; Ottawa Citizen;	Interviewed expert

INVITED PRESENTATIONS - NATIONAL

2003	Invited Presentation, "Soft Tissue Infections among Users of Black Tar Heroin: A Cross-Methodological Examination", Community Epidemiology Working Group, National Institutes of Drug Abuse, San Francisco, CA
2003	Invited Lecture, "Soft tissue Infections among Injection Drug Users: Community Strategies for Treatment and Prevention", Demand Treatment! Partners Institute, National Meeting, San Francisco, CA

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2003	Session Chair, ""Heroin in Black and White: Explaining the Unequal Diffusion of HIV among Injection Drug Users in the United States", Annual Meeting of the American Anthropological Association, Chicago, IL	
2004	Panel Presentation in Doctor Involvement in the Grassroots Development of Harm Reduction, "Improving Care for Persons with Soft Tissue Infections", Fifth Annual Harm Reduction Conference, New Orleans, LA	
2006	Invited Presentation, "Heroin in Brown, Black and White: Structural Factors and Medical Consequences", National Development and Research Institutes, New York City, NY	
2006	Panel Moderator, "Clinical Interventions", Sixth Annual Harm Reduction Conference, Oakland, CA	
2007	Panel Moderator, "Medical Consequences of Methamphetamine Use", Second National Conference on Methamphetamine, HIV, and Hepatitis: Science and Response 2007, Salt Lake City, Utah	
2010	Panel Moderator, 8th National Harm Reduction Conference, Austin, TX	
2012	Panel Moderator, 9th National Harm Reduction Conference, Portland, OR	
2014	"Intertwined Epidemics: Opioids and Heroin", 38th Annual AMERSA National Conference, San Francisco, CA, November 6-8, 2014.	Plenary Speaker
2015	"The Changing Landscape of Prescription Opioid Abuse: Intertwined Epidemics," RADARS System, 9th Annual Scientific Meeting:Bending the Curve of Prescription Drug Abuse, Washington, DC, May 6, 2015	Plenary Speaker
2015	9th Annual AMERSA National Conference, Washington, DC, November 5-6, 2015.	Panel Moderator
2016	Society for Applied Anthropology Annual Meeting, Vancouver, BC, Canada, March 29 - April 2, 2016	Session Chair
2016	Invited presenter to the National Academies of Science, Medicine and Engineering: Intertwined epidemics: heroin and opioid overdoses. Sept. 22, 2016	

Prepared: August 3, 2020

2016	A More Dangerous "Heroin": emerging patterns in the heroin overdose epidemic, 11th National Harm Reduction Conference, San Diego, CA, Nov 3-6, 2016.	Panel organizer and moderator
2016	Panel presentations (Major Session): "Illicitly Manufactured Fentanyl in the United States: Implications for Overdose Prevention and Public Health." Lead presenter; 3/5 of the presentations in this panel stem from the Heroin in Transition research. 11th National Harm Reduction Conference, San Diego, CA, Nov 3-6, 2016.	Organizer and lead presenter
2017	Invited Presentations organized by the American Association for the Advancement of Science (AAAS): • Intertwined Epidemics: Heroin and Opioids. At the Science and Technology Policy Forum, AAAS, March 27, 2017. Alongside Wilson Compton, Deputy Director NIDA • Intertwined Opioid Epidemics: Prescription Pills, Heroin and Fentanyl. May 10, 2017. Presented to: o The Congressional Neuroscience Caucus Luncheon, 2456 Rayburn House Office Building o The Neuroscience and Society meeting. Alongside Nora Volkow, Director of NIDA, and Karen Drexler, VAMC. Sponsored by AAAS and the Dana Foundation • Judicial Seminar on Emerging Issues in Neuroscience. Sponsored by the American Association for the Advancement of Science, the Federal Judicial Center, the National Center for State Courts, the American Bar Association Judicial Division, and the Dana Foundation. Hosted by the University of Arizona College of Law, November 2-3, 2017	Keynote or featured speaker
2017	Invited panel: Ciccarone D, Mars S, Unick J, Ondoscin J. Heroin in Transition (Part 1): US regional differences in the opioid pill and "heroin" overdose epidemics; and Heroin in Transition (Part 2): User Experience with and Perceptions of Novel Forms of Heroin in Three Eastern US States. National Opioid and Heroin Summit, Atlanta, GA, April 18-19, 2017. Note: This was the lead panel in the Heroin Track. Note: Press release with at least a dozen media mentions stemming from these.	Organizer, lead presenter

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2017	Invited presentation: Mars S G., Ondocsin, J. and Ciccarone, D. "A more dangerous heroin: emerging patterns, adulteration and users' perceptions.", Maine 5th Harm Reduction Conference, Belfast, Maine, May 10th 2017	
2017	Invited webinar: Heroin In Transition: Supply Changes, Adulteration and Consequences. To the AIDS Institute, NYS Department of Health. May 31, 2017	Presenter
2017	Invited Grand Rounds: Psychiatry Grand Rounds series at Rush University Medical Center: "A More Dangerous 'Heroin': Supply Changes, Adulteration and Users' Perceptions." Oct 5, 2017, Chicago, IL	Grand Rounds presenter
2017	Invited Plenary Presentation: The Triple Wave Epidemic: Opioids, Heroin and Fentanyl as part of the panel: Understanding and Responding to Today's Drug Market. In: Heroin Response Strategy Symposium organized by eight High Intensity Drug Trafficking Areas (HITDAs) and sponsored by the US Office of National Drug Control Policy (ONDCP) and the US Centers for Disease Control and Prevention, Injury Branch. Nov 7, 2017, Atlanta, GA	High profile presentation; presenter
2017	National media mentions: • New York Times; 5 articles, 3 front page • Buzzfeed; 3 articles • New Yorker; 2 articles • Science (American Association for the Advancement of Science); 2 articles • 538.org; 2 articles • STAT News; 2 articles • Chicago Tribune; 2 articles • Mother Jones; 2 articles • Nature • Washington Post • Glamour magazine • ABC Nightline (online) • Bloomberg • American Libraries • Insight Crime • The Reason • Pacific Standard • Slate • The Cut • Record Searchlight • The Daily Times and Delmarvanow.com • The Washington Post • San Francisco Magazine • Los Angeles Times • Others which spun off of above articles	interviewed expert
2018	Bloomberg Philanthropies: expert convening on the opioid epidemic	Speaker and Discussant at this high-level expert meeting
2018	American College of Toxicology, annual meeting	Plenary speaker

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2018	Invited Presentations organized by the American Association for the Advancement of Science (AAAS): Judicial Seminar on Emerging Issues in Neuroscience. (Similar to events in 2017). Seminars in Pittsburg PA and San Diego, CA.	Featured speaker
2018	Aspen Institute sponsored event: Discussion on the opioid crisis alongside author Ryan Hampton	Featured speaker
2018	National media mentions: • California Healthline/ Kaiser Health News • Audrey M Provenzano MD, MPH Review of Systems Podcast • Vice news x 3 • Mother Jones x 4 • Chicago Tribune • Newsweek x 2 • Nature (and audio podcast) • Time • NYT x 4 (one piece was initiated by me; another was front page) • Sentinel (PA) x 2 • Buzzfeed x 2 • Washington Post x 2 • 538.org x 2 • Stat news x 3• HuffPost • Washington Times • Vox • LA Times x 2• Philly NPR affiliate • Rolling Stone x 2 • Clinical Psychiatry News • Daily Beast • WWL (radio; New Orleans) • Healthline Media; Buzzfeed; Alcoholism & Drug Abuse Weekly; WV NPR; multiple for Congressional hearing (see Mendeley); The Atlantic; CNN; Bloomberg; Vice; Pew Charitable Trust; NYC Daily Mail	Interviewed expert
2018	Iowa Harm Reduction Conference. Keynote presentations at 2 events including main conference	Keynote speaker
2018	Grand Rounds at University of Iowa Medical School	Featured speaker
2019	Invited Presentations organized by the American Association for the Advancement of Science (AAAS): Judicial Seminar on Emerging Issues in Neuroscience; Miami, FL. (Similar to events in 2017). “The Opioid Crisis”, Sponsored by The American Association for the Advancement of Science and The Montana Supreme Court Judicial Education Committee; Whitefish, MT.	Featured speaker
2019	CATO Institute: “Harm Reduction: Shifting from a War on Drugs to a War on Drug-Related Deaths”	Featured speaker
2019	“The Triple Wave Epidemic,” to the A4A’s (airline industry group) Drug & Alcohol Program Managers Working Group	Featured speaker

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2019 National media mentions: PBS special on inequality; Interviewed expert US NEWS and World Report, in three parts of a 5 piece series; VICE news x 2; Buzzfeed x 2; New Yorker; NBC; Medium; New York Times; Josh Katz and Margot Singer-Katz, NYT (consulting for future pieces); The Fix; The Ringer; LA Times; Washington Post; Vice x 2; CNN; Associated Press; Rough Translation; Morning Edition, NPR; Radiolab; Pacific Standard; Science news on AAAS Judicial Seminars

INVITED PRESENTATIONS - REGIONAL AND OTHER INVITED PRESENTATIONS

2001	Invited Presentation, "Reducing the Risk of Skin and Soft Tissue Infections", Medical Consequences of Illicit Drug Use: Prevention and Clinical Management, Community Dissemination Conference, San Francisco Treatment Research Center, San Francisco, CA	
2001	Grand Rounds, "Biological and Behavioral Predictors of Soft Tissue Infections in Injection Drug Users", Family Medicine, San Francisco General Hospital, San Francisco, CA	Grand Rounds
2001	Grand Rounds (with D. Young, MD and H. Harris, MD), "Soft Tissue Infections and Injection Drug Use", Surgery, University of California, San Francisco, San Francisco, CA	Grand Rounds
2002	Grand Rounds (with K. Cho, MD), "Amyloidosis and Abscess among Heroin Users at SFGH", Medicine, San Francisco General Hospital, San Francisco, CA	Grand Rounds
2003	Invited Presentation, "Culture and Infection: Understanding Risk-taking among Heroin Users in San Francisco", California Society of Addiction Medicine Annual Meeting, San Francisco, CA	
2004	Invited Presentation, "Explaining the Geographical Variation of HIV among Injection Drug Users in the United States", Practice Improvement Collaborative, Community Behavioral Health Services, San Francisco Department of Public Health, San Francisco, CA	
2004	Training, "The Medical Complications of Injection Drug Use", HIV Prevention Project, San Francisco AIDS Foundation, San Francisco, CA	

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2004	Invited Presentation in Understanding and Interviewing Around Mental Illness and Substance Abuse, "Understanding the Effects of Substance Abuse", Habeas Corpus Resource Center, San Francisco, CA	
2005	Invited Presentation, "Understanding HIV-related Risk and Risk-taking among Injection Drug Users", UCSF Student AIDS Forum, San Francisco, CA	
2005	Grand Rounds (with Philippe Bourgois, PhD), "'Water Works:' Anthropological Perspectives on HIV Prevention", General Internal Medicine, San Francisco General Hospital, San Francisco, CA	Grand Rounds
2006	Invited Presentation, "Dope at Discount: Heroin Price and Purity in the U.S.", Disability Evaluation and Consultation Unit, City and County of San Francisco Human Services Agency, San Francisco, CA	
2008	Invited Lecture, "'Video Doctor' Intervention Reduces Sex and Drug Risk, including Methamphetamine use, among HIV-Positive Clinic Patients," Drug User Research Group (DURG), San Francisco General Hospital, San Francisco, CA	
2009	Grand Rounds, "Heroin in Brown, Black and White: Market Trends and Medical Consequences," General Internal Medicine, San Francisco General Hospital, San Francisco, CA	Grand Rounds
2010	Invited Presentation, "Working at The Margins: 10 Years of Social Research in HIV Prevention," in Pathways to Careers in Clinical and Translational Research Seminar Series, sponsored by the UCSF Clinical and Translational Research Institute. San Francisco, CA	
2013	Invited Lecture, "Fire in the Vein: Preliminary Observations on Heroin Acidity," Drug User Research Group (DURG), San Francisco General Hospital, San Francisco, CA	
2014	Radio interview: KALW: City Visions, "Heroin and Harm Reduction." Panel discussion on new heroin threats and clinical, public health and policy responses. Live, 2.24.14	
2016	Presenter: "Counterfeit opioid pills containing fentanyl." Marin Addiction Medicine Journal Club. Oct., 6, 2016	Presenter

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2016	Invited Lecture (with Sarah Mars), "It's not heroin anymore: Supply changes, adulteration and users' perceptions." Drug User Research Group (DURG), San Francisco General Hospital, San Francisco, CA. Oct 20, 2016	Presenter
2016	Invited presentation, "It's not heroin anymore: Supply changes, adulteration and users' perceptions." Scientific Working Group, San Francisco Dept. of Public Health, San Francisco, CA. Dec., 6, 2016	Presenter
2017	Invited presentation: "A More Dangerous "Heroin": Emerging Patterns In The Heroin Overdose Epidemic." SF Veteran's Administration Medical Center Addiction Medicine Fellowship. Jan 25, 2017	Presenter
2017	Speaker on the opioid epidemic as part of Leadership San Francisco, class of 2017. April 20, 2017	Presenter
2017	Invited presentation: "Understanding Changes in the US 'Heroin' Market: Notes from the Field," Drug User Research Group (DURG), San Francisco General Hospital, San Francisco, CA. Dec. 14, 2017	Presenter
2017	Radio interviews: • KDKA, Pittsburg 6/6/17 • KCBS, SF 6/7/17 • KPFA, Berkeley, 6/12/17 • KVMR, Nevada City 6.20	interviewed expert
2018	UC CENTER SACRAMENTO CAPITOL INSIGHTS PANEL: ADDRESSING THE OPIOID CRISIS IN CALIFORNIA	Speaker
2018	Regional media mentions: • KQED California report x2 (one with audio podcast) • KQED Forum; KQED online • KQED (background) • KQED news • UCSF Magazine; UCSF in The News; Medium (online version of the magazine article plus video) • KCBS • KTVU	Interviewed expert
2018	Community forum, Keynote Speaker: The Changing Face of the Opioid Epidemic. Sponsored by Marin Health and Human Services, Dominican University and Rx Safe Marin	
2019	Local media: KQED; KPIX TV, KTVU TV, April Dembrowsky, NPR x 2; City on a Hill Press at UC Santa Cruz; KQED Forum; Vivian Woo (UCB student)	Interviewed expert
2019	DFCM Journal club presentation	Featured speaker
2019	Grand Rounds, Veterans Administration Medical Center, SF	Featured speaker

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GOVERNMENT AND OTHER PROFESSIONAL SERVICE

1999 - 2001	San Francisco Department of Public Health	Member, Wound Triage and Care Subcommittee, San Francisco General Hospital
1999 - 2001	San Francisco Department of Public Health	Member, Task Force on Management of Patients with Abscesses and Injection Drug Use
1999 - 2002	San Francisco Department of Public Health	Member, Community Advisory Board, Action Point Adherence Project
2000 - 2000	San Francisco Board of Supervisors and Health Commission	Public Testimony
2007 - 2007	Medical Research Council (UK equivalent of NIH)	Grant reviewer
2014 - 2014	NIH, National Institute on Drug Abuse (NIDA)'s National Early Warning System (NEWS): RO1 Special Emphasis Panel	Co-Chair; Grant reviewer
2014 - 2014	NIH, National Cancer Institute: Using Social Media to Understand and Address Substance Use and Addiction; RO1 Special Emphasis Panel	Grant reviewer
2014 - 2019	NIH/NIDA and University of Maryland: National Drug Early Warning System (NDEWS) - Scientific Advisory Group	Member
2016 - 2016	CDC National Center for Injury Prevention and Control Extramural Research Program Office. Special Emphasis Panel: Research on Prescription Opioid Use, Opioid Prescribing and Associated Heroin Risk.	Review Committee member
2016 - 2016	Consultation on Opioid-related Morbidity and Mortality Surveillance, National Center for Injury Prevention and Control (NCIPC) at the Centers for Disease Control and Prevention (CDC)	Invited expert
2016 - present	Board of Scientific Counselors at the National Center for Injury Prevention and Control (NCIPC) at the Centers for Disease Control and Prevention (CDC).	Nominee. Appointed by the Secretary of the U.S. Department of Health and Human Services (DHHS).

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2016 - 2017	Drug Policy Alliance. Reviewed legislation: heroin-assisted treatment (HAT) bill for Nevada (2016), Maryland (2016) and re-introduced in Nevada (2017)	Consultant
2016 -	Consultation on Naloxone App Competition; with Dr. Peter Lurie, FDA Associate Commissioner for Public Health Strategy and Analysis	Consultant
2016 -	National Institute on Drug Abuse, NIH, Special Emphasis Panel: "Mechanism for Time-Sensitive Drug Abuse Research (R21)".	Grant reviewer
2017 - present	Food and Drug Administration (FDA) Center for Drug Evaluation and Research; Drug Safety and Risk Management Advisory Committee (DSaRM) • Four meetings in 2017; Three in 2018 • Meeting on "Opana" (brand named long-acting hydromorphone) led to successful FDA action and its withdrawal from the market; other meeting topics: abuse deterrent formulations, post marketing surveillance, opioid packaging (including short term, internet enabled and abuse deterrent), naloxone (formulations and increasing distribution)	Advisory Committee Member/ Special Government Employee
2017 -	US Governmental Accountability Office	Interviewed for congressional report
2017 -	NYS Governor's Office	Consultant
2017 -	NYS Health Department	Consultant
2017 -	Colorado Department of Public Health and Environment	Consultant
2017 -	Facing Addiction In America: The Surgeon General's Report on Alcohol, Drugs, and Health	Citation of some of our work
2017 -	Senator Kamala Harris' letter to Alkermes	Direct quote of mine in her letter to a pharmaceutical company
2017 -	Report: The President's Commission on Battling Drug Addiction and The Opioid Crisis	Citation of some of our work
2017 -	Office of National Drug Control Policy	Sharing of data upon request with Acting Director Richard Baum
2017 -	MacArthur Fellows Program, John D. and Catherine T. MacArthur Foundation	Invited confidential nominator
2018 -	Drug Policy Alliance convening on U.S. Sentencing Commission March 14, 2018 Public Hearing on fentanyl; letter to ACLU	Expert consultant

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2018 -	West Virginia consultations: Charleston, WV City Council; Consultant WV State Health Office; Charleston syringe exchange task force;	
2018 -	Behavioral Health System Baltimore; Public Health Strategic Initiatives, fentanyl campaign	Consultant
2018 -	Julia Vieweg, Senior Analyst, Homeland Security & Justice Division, US Government Accountability Office	Consultant
2018	Jennifer J. Marks, intelligence Analyst – Narcotics and Contraband Branch, U.S. Customs and Border Protection;	Consultant
2018 -	Centers for Disease Control and Prevention; HIV/viral hepatitis division: Epi-Aid HIV outbreak investigation by request of Massachusetts Dept. of Public Health.	Consultant
2018 -	Consultation with staff in the office of Congressperson Ted Budd (NC-13) regarding pending legislation	Consultant
2018	Marin County District Attorney candidate Anna Pletcher	Consultant
2018 -	CONGRESSIONAL TESTIMONY: Before the Committee on Foreign Affairs, Subcommittee on Africa, Global Health, Global Human Rights, and International Organizations, United Sates House of Representatives. Hearing: Tackling Fentanyl: The China Connection, September 6, 2018.	Invited expert
2018	National Institute of Justice, a division of the DOJ: invitation only meeting to discuss the state of America's opioid crisis; to learn promising practices, and inform a research agenda moving forward. Sponsored by NIJ and RAND	Invited expert
2019	DPA research incubator	Consultant
2019	UCLA CFAR-Sponsored "Slowing the Emerging Opioid Epidemic in California" Meeting; L.A., CA	Invited expert
2019 - present	University of Pittsburg Substance Use Natural History Expert Stakeholder Panel	Member, Scientific Advisory Board
2019	NIDA Great Lakes Clinical Trials Network; Niranjan S. Karnik, MD, PhD, Principal Investigator	Member, External Advisory Board
2019	Vera Project: Transforming the Justice System's Response to Drugs	Interviewed expert

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2019	Pew Charitable Trusts: report on medication assisted treatment for opioid use disorder; specifically on the need to amend the DATA 2000 law on buprenorphine waiver training. This report has been incorporated into introduced legislation: Mainstreaming Addiction Treatment (MAT) Act – H.R. 2482; Lead Sponsors: Tonko (D-NY), Delgado (D-NY), Lujan (D-NM), Budd (R-NC), Stefanik (R-NY), Turner (R-OH)	Interviewed for Congressional report
2019	Educational panel for congressional staff on reforming the buprenorphine x waiver. Part of the educational campaign for the Mainstreaming Addiction Treatment (MAT) Act – H.R. 2482 (see above); Sponsored by Pew Charitable Trust. Canon Building, Washington, DC	Invited panel expert

UNIVERSITY AND PUBLIC SERVICE

SERVICE ACTIVITIES SUMMARY

I have always strongly believed in giving back. My service activities while on the faculty at UCSF have involved giving back to the communities I have engaged as part of my research. For example, I have helped developed clinics at several harm reduction service providers, engaging clients at a very early step in their clinical care in a trusting environment. I have been on the Board of Directors for a youth oriented harm reduction service provider. At UCSF, I have provided service at the medical student, FCM departmental and School of Medicine wide levels.

At the UC system wide level, I served, for six years, as the UCSF representative to the Pacific Rim Research Program Executive Committee. This committee implements a \$500-750k annual granting program through the UCOP. The executive committee determines eligibility and awards for a diverse array of faculty and graduate student projects involving research in the culturally, politically and economically important Pacific Rim region.

I currently serve on the UC-wide opioid curriculum task force. At UCSF, I served from 2017-19 at the request of the Vice Provost, Academic Affairs office, on two committees reviewing faculty misconduct and sexual violence cases.

In 2019, I received the UCSF Chancellor's Award for Public Service. This award stems from my continuing advocacy for rational evidence-based drug policies esp. in light of the prolonged opioid crisis. My public service includes both extensive media involvement (see invited "presentations" above) as well as government service. My government service is expanding with consultations at the behest of the US Centers for Disease Control and Prevention, US Food and Drug Administration and nomination to the Board of Scientific Counselors at the National Center for Injury Prevention and Control. I have served in a variety of situations, as an expert and consultant, in many governmental and NGO inquiries.

My contributions to diversity are stated below.

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UNIVERSITY SERVICE
UC SYSTEM AND MULTI-CAMPUS SERVICE

2008 - 2014	Pacific Rim Research Program, Executive Committee	UCSF Representative
2017 - present	UC system-wide Opioid Curriculum Workgroup	UCSF Representative

UCSF CAMPUSWIDE

2005 - present	Academy of Medical Educators	Member
2006 - 2008	Pacific Rim Research Program, UCSF Selection Committee	Member
2007 - present	Center for AIDS Research	Member
2007 - 2010	Academy of Medical Educators, Faculty Development Working Group	Member
2010 - 2014	Academy of Medical Educators, Scholarship Working Group	Member
2015 - 2015	Academy of Medical Educators, Academy Growth and Membership Working Group	Ad hoc member
2016 - 2019	Standing Panel for Faculty Misconduct Investigations. UCSF Vice Provost Academic Affairs Office	Member
2017 - 2019	Peer Review Committee for Sexual Violence Cases. UCSF Vice Provost Academic Affairs Office	Member

SCHOOL OF MEDICINE

1995 - 1995	UCSF Medical Student Homeless Clinic. UCSF School of Medicine website headliner story, written by MS1 Jeffrey Chen, highlights this clinic and some of my teaching (posted 2.14.14): " http://medschool.ucsf.edu/features/night-ucsf-homeless-clinic " http://medschool.ucsf.edu/features/night-ucsf-homeless-clinic	Preceptor
1997 - 1999	UCSF Children's Health Hut	Preceptor
2000 - 2006	Culture and Behavior (CAB) in the Curriculum Committee	Member
2003 - 2004	International Program Committee, Subcommittee Global Health Curriculum	Member
2004 - 2004	Family Medicine Interest Group	Panel Member
2004 - 2006	Medical Scientist Training Program Council	Ad-Hoc Member
2004 - 2006	UCSF Multicultural Linkage of Education, Action and Research Networks (LEARN) Program	Member
2004 - 2006	Health Disparities Curriculum Working Group	Member

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2004 - 2008	American Medical Students Association, UCSF Chapter	Faculty Advisor
2006 - 2008	UCSF Student AIDS Forum	Faculty Advisor
2006 - 2008	Social and Behavioral Science Curriculum committee	Member
2009 - 2016	Foundations of Patient Care Course	Co-Director
2009 - 2016	Mini-Clinical Performance Examination	Preceptor
2009 - 2016	Observed Structured Clinical Examination (OSCE)	Preceptor
2010 - 2010	Essential Core Compass Committee	Member
2009 - 2011	Velo-Med, UCSF biking club	Faculty Advisor
2012 - 2015	UCSF School of Medicine "Flu Crew" - delivering influenza vaccines to homeless populations	Preceptor
2011 - present	Drug User Research Group (DURG) Seminar	Co-Director
2012 - 2016	Clinical Courses Operations Committee (CCOC)	Member
2014 - 2016	School of Medicine Bridges curriculum; Clinical Microsystems Clerkship / Foundations of Patient Care; Documentation and Presentations WG; Clinical Reasoning WG	Lead or Co-Lead

DEPARTMENTAL SERVICE

2000 - 2005	Culture in the Curriculum Committee, DAHSM	Member
2001 - 2001	Expert Panel, Baymen/SUMIT Study, DOM	Member
2001 - 2003	Community Advisory Board, VOICE Study, DOM	Member
2006 - 2007	Advisory Group for Social Medicine Graduate Degree Program, DAHSM	Member
2006 - 2011	DFCM Family Medicine Research Seminar	Co-Director
2007 - 2011	DFCM Mentoring Oversight Committee	Member
2010 - present	DFCM ad hoc faculty review committee	Member
2011 - 2012	Center for AIDS Prevention Studies (CAPS) International Visiting Scholars Program, DOM	Peer-reviewer
2012 - 2015	DFCM promotions committee	Member
2013 - 2015	DFCM Education Advisory Group	Member
2013 - present	DFCM Scientific Review Committee	Member
2014 - present	DFCM Educational Leadership Committee	Member
2019	DFCM faculty search committee	Member

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COMMUNITY AND PUBLIC SERVICE

1999 - 2009	Homeless Youth Alliance	Volunteer Physician
2000 - 2002	Homeless Youth Alliance	Medical Director
2002 - 2002	Clarendon Elementary School, San Francisco, CA	Guest Lecturer to 5th Graders
2003 - 2004	Haight-Ashbury Free Medical Clinic	Volunteer Physician
2004 - 2014	Homeless Youth Alliance	Member, Community Advisory Board
2004 - 2004	HIV Prevention Project, San Francisco AIDS Foundation	Guest Trainer
2010 - 2014	Tenderloin Health	Member, Community Advisory Board
2012 - 2012	Berkeley NEED (Needle Exchange Emergency Distribution)	Physician support and advisor
2018-2019	Worked with several community students on school projects (print, film and social media) related to the opioid crisis; both locally eg Tam High School (Lauren Walk and Milo Levine) and nationally eg Pennsylvania (Amanda Stapf), among others	Interviewed expert

CONTRIBUTIONS TO DIVERSITY

CONTRIBUTIONS TO DIVERSITY

My career is dedicated to providing service to urban underserved, marginalized and stigmatized persons and communities. My research, teaching and clinical activities center on HIV/AIDS, substance use, poverty, stigma and sexual diversity. Understanding the persons living and struggling with these issues is a key aspect of what I study and teach.

TEACHING AND MENTORING

TEACHING SUMMARY

In my activities as a medical educator, I have largely worked towards improving the social, behavioral and prevention science content within the undergraduate medical school curriculum. This has entailed developing and delivering new lectures, small group discussions, and independent learning modules, as well as evaluation of this material through student examination, student feedback and external review. In my first 10 years as an educator, I worked on several curriculum committees, served as Co-Director of Social Science Curriculum Integration (one year) and Block Coordinator for social science integration for the Infections, Immunity and Inflammation Block. In this latter capacity, I have focused on improving the HIV, sexuality and prevention content of the core curriculum.

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In 2009, I became Co-Director for the Foundations of Patient Care (FPC) course. In this role, I designed and administrated FPC during the Organs Block of the Essential Core course. During the eight years I was Co-Director, FPC expanded in content and was increasingly well received and evaluated by the students. I was also Director of the Transitional Clerkship (TC), a two-week immersion and preparation course for medical students transitioning to their clinical training years. Under my leadership, Transitional Clerkship became a highly evaluated and well regarded course. Vice Dean (at the time) Helen Loeser remarked at a curricular leadership meeting that she had never seen a course improve so rapidly and dramatically. In both of these roles, I was responsible for designing extensive curricula, editing syllabi (see Creative Activities, Teaching - below), recruiting faculty, hosting sessions and direct teaching, as well as, designing and leading assessment activities. It is a rewarding job done in full collaboration with the FPC Director, Co-Directors and staff.

I have contributed in many ways to the current Bridges Curriculum; leading working groups in medical documentation and clinical reasoning as well as proposing a longitudinal curriculum for essential TC components. My FPC post ended with the start of Bridges. I have taught in the Inquiry curriculum since.

In addition to teaching within the formal curriculum, I have had broad participation in the elective and informal educational sphere within the School of medicine. In this arena, students with the most interest in community medicine developed electives in which they and their colleagues received more advanced teachings. I contributed to these fascinating electives: Pathways to Discovery; Caring for The Underserved; Public Health, Law and Homelessness; Poverty Medicine Elective and Improv and Medicine. I also have developed an elective in substance use, entitled, "Understanding the Complexities of Substance Use 'in The Real World.'" The course is well-received and has been described in a brief publication in Medical Education.

I have also had the opportunity and pleasure of working closely with several medical students involved in curricular development and revision. In the Infections, Immunity and Inflammation Block I have worked with former students Phillip Coffin and Genevieve Preer on revising the HIV/STD and sexuality content; work that had satisfying and lasting results and which resulted in a "Really Good Stuff" publication in Medical Education. Working with students Brynn Utley and Ari Hoffman, I have consulted on their Improv and Medicine elective, leading to another descriptive piece in Medical Education.

Beginning in 2018 and continuing to the present, I have focused my efforts on curriculum development and advising related to addiction medicine. I am a key participant in the UC system-wide Opioid Curriculum Workgroup helping develop competencies for student education in pain management and substance use disorders treatment. I am supervising or mentoring several students and post-docs in their addiction related educational or research efforts. In addition, I am faculty advisor for the student run harm reduction and addiction medicine student interest group (and their fall elective) and am affiliated faculty for the UCSF Primary Care Addiction Medicine Fellowship. In 2019, I lectured in the UCSF Mini-Medical School (for the public) on addiction.

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FORMAL TEACHING (past five years)

	Academic Yr	Course No. & Title	Teaching Contribution	School	Class Size
	2015 - 2016	FCM 131, Foundations of Patient Care, Department of Family and Community Medicine	Small Group Facilitator	Medicine	8
	2015 - 2016	FCM 131, Foundations of Patient Care, Department of Family and Community Medicine	Co-Director	Medicine	140
	2015 - 2016	Inflammation, Immunity and Infection Block: "Culture and Infection: Understanding HIV and Abscesses"	Lecturer	Medicine	140
	2015 - 2016	Organs Block/FPC: "Clinical Reasoning" lecture	Co-Lecturer	Medicine	140
	2015 - 2016	Organs Block/FPC	Co-Director for FPC	Medicine	140
	2015 - 2016	Clinical Interlude	Director	Medicine	140
	2015 - 2016	Master Clinician's Corner for Clinical Reasoning (MC3R)	Lecturer	Medicine	140
	2015 - 2016	Transitional Clerkship	Director, lecturer	Medicine	170
	2016 - 2017	Inflammation, Immunity and Infection Block: "Culture and Infection: Understanding HIV and Abscesses"	Lecturer	Medicine	140
	2016 - 2017	Public Health and Homelessness: Intersections of Law and Health Care	Lecturer	UC Hastings	15
	2016 - 2017	Transitional Clerkship	Director, Lecturer	Medicine	170

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	Academic Yr	Course No. & Title	Teaching Contribution	School	Class Size
	2016 - 2017	CODA	Guest Lecturer	Medicine	140
	2017 - 2018	Core Inquiry Curriculum; BRIDGES	Small group discussion leader for several blocks: Ground School; ABC; Health & Individual; Renal, Endocrine, GI, Nutrition; Health & Society; Pathogens & Host Defense		8 students x 7 blocks
	2017 - 2018	Public Health and Homelessness: Intersections of Law and Health Care	Lecturer	UC Hastings	15
	2018 - 2019	Public Health and Homelessness: Intersections of Law and Health Care	Lecturer	UC Hastings	15
	2019	UCSF Mini-Medical School	Lecturer	Medicine	25

INFORMAL TEACHING

2003 - present Preceptor and Guest Lecturer, UCSF Medical Student Homeless Clinic Elective (4 times/year), UCSF School of Medicine

2004 - 2005 Contributor, Critical Social Science Clinical Case Conference (This seminar series, led by Vincanne Adams and Nirajan Karnik, is intended for MD/PhD students in the Anthropology, History and), UCSF Department of Anthropology, History, and Social Medicine

2004 - 2010 Faculty Advisor, American Medical Students Association, UCSF Chapter (monthly), UCSF School of Medicine

2005 - 2008 Co-Developer and Leader, QUIDUS: Qualitative Inquiry into Drug Use Seminar (This seminar series, co-developed with Sarah Mars and Philippe Bourgois, is intended for researchers interested in qualitative), UCSF Department of Anthropology, History, and Social Medicine

2005 - 2005 Small Group Facilitator, FCM Workshop on Teaching and Working with Underserved Populations (Workshop for community physicians to discuss the challenges and opportunities in providing service to underserved populations.), UCSF Department of Family and Community Medicine

2006 - 2007 Lecturer, Pathways to Discovery (Medical student organized seminar series on medical academic careers.), UCSF School of Medicine

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2006 - 2007 Participant, Improv and Medicine (Medical student elective on improving communication skills and team work using improvisation drama techniques.), UCSF School of Medicine

2007 - 2015 Facilitator, Educator's Portfolio Workshop, Leader: Jessica Muller, PhD, UCSF Academy of Medical Educators

2010 - 2015 Tutor, The 20th Annual Writing for Medical Journals Workshop: A Workshop to Prepare Family Medicine Faculty as Writers, Green Gulch, CA, March 8-10, 2010

2011 - 2012 Presenter, The 21st Annual Writing for Medical Journals Workshop: A Workshop to Prepare Family Medicine Faculty as Writers, Green Gulch, CA, March 7-9, 2011; again March 12-14, 2012

2014 - 2014 Invited Panelist, Faculty Development Workshop: "Active Approaches to Learning" at Samuel Merritt University, August 26th, 2014

2016 - 2016 Invited Panelist, "The opiate misuse epidemic: What can we learn from it?" Full campus student organized event co-sponsored by FMIG, AMSA and other student groups

2017 - 2018 UCSF Primary Care Addiction Medicine Fellowship; Affiliated Faculty

2018 - 2019 Faculty Advisor: Harm reduction and addiction medicine student interest group

2019 - 2020 Faculty Advisor: Harm Reduction and Addiction Medicine Elective

PREDOCTORAL STUDENTS SUPERVISED OR MENTORED

Dates	Name	Program or School	Mentor Type	Role	Current Position
2000 - 2012	Seth Holmes, MD/PhD candidate	UCSF Department of Anthropology, History and Social Medicine	Career Mentor	MD, PhD, RWJ Fellow	Assistant Professor, School of Public Health, UCB; Assistant Professor in Residence, DAHSM, UCSF
2004 - 2005	Micaela Godzich, MS-II	UCSF School of Medicine	Project Mentor	Resident; Family Medicine, UCSF, Martinez	
2004 - 2005	Christina Milano, MS-IV	UCSF School of Medicine	Mentor, career advising	Resident; Family Medicine	

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Dates	Name	Program or School	Mentor Type	Role	Current Position
2004 - 2005	Ippy Kalofonos, MD/PhD Candidate	UCSF Department of Anthropology, History, and Social Medicine	Project Mentor	MS-III; PhD Completed	
2004 - 2005	Ben Peacock, PhD Candidate	UCSF Department of Anthropology, History, and Social Medicine	Project Mentor	Graduated: PhD	
2004 - 2005	Brian Laing, MS-II	University of California, San Francisco	Mentor (Health Disparities Curriculum Development)	Resident: UCSF Family Medicine	
2004 - 2005	Jennifer Singler, MS-III	UCSF School of Medicine	Preceptor, Clinician exam skills (CPX)	Resident; UCD Pediatrics	
2004 - 2006	Zadok Sacks, MS-II	UCSF School of Medicine	Informal Mentor, student interested in medical Anthropology	Resident: Harvard Medicine/Pediatrics	
2004 - 2006	Shana Harris, PhD Candidate	UCSF Department of Anthropology, History, and Social Medicine	Co-Mentor/Clinical Mentor	PhD Candidate; Field Work in Argentina	Faculty, U. of Arizona
2004 - 2012	Phillip Coffin, MS-IV	UCSF School of Medicine	Project Mentor, Career Mentor	Student, Resident, Fellow	SFDPH, Director of HIV Prevention
2004 - 2011	Nathan Sackett, RN	UCSF School of Nursing	Mentor, premedical advising	Matriculated UCB/UCSF Joint Medical Program, Fall 2010	

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Dates	Name	Program or School	Mentor Type	Role	Current Position
2005 - 2007	Alex Greninger, MS-I	UCSF School of Medicine	Informal Mentor, career advising	MD, PhD Candidate	
2006 - 2007	Brian Mohlenhoff, MS-I	UCSF School of Medicine	Faculty Sponsor, UCSF Student Research Summer Fellowship, Informal Mentor	Post-doc Fellow, UCSF/VA Dept. of Psychiatry	
2006 - 2009	Heather Logge	University of California, San Francisco School of Medicine	Informal Mentor, Pre-Medical Advising	UCSF School of Medicine, MS-IV	
2006 - 2008	Reshma Gupta, MS-II	UCSF School of Medicine	Informal career advising	Resident, Internal Medicine, U. of Washington	
2007 - 2008	Paloma Sales	UCSF Department of Social and Behavioral Sciences	Third Exam Committee Member	PhD Candidate; advanced to candidacy	
2007 - 2008	Robin Higashi	UC Berkeley Department of Anthropology	Dissertation Committee Member	PhD completed; Research Associate, Border Health Foundation, Tucson, AZ	
2007 - 2010	Scott Stonington, MD/PhD candidate	UCSF Department of Anthropology, History and Social Medicine	Preceptor, Informal Mentor, Career Advisor	Resident, Internal Medicine, Brigham and Women's Hospital; Fellow, Global Health and Social Medicine, Harvard	
2007 - 2010	Timoteo Rodriguez	UC Berkeley Department of Anthropology	Orals Committee Member	PhD Candidate	

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Dates	Name	Program or School	Mentor Type	Role	Current Position
2007 - 2009	Ari Hoffman	University of California, San Francisco School of Medicine	Project Mentor	Student	Faculty, Internal Medicine, UCSF
2008 - 2009	Emi Yoshida		Pre-med informal advisor	Matriculated into Med school	
2009 - 2010	Serena Roth	University of Pennsylvania	Informal advisor; research methods	R2; Medicine	
2010 - 2010	Paul Gilbert	UNC Chapel Hill School of Public Health	Project Mentor, Co-Mentor/Clinical Mentor	Doctoral Student, Kenan Fellow, NIH National Research Service Award recipient	
2010 - 2010	Jordan Cloyd	University of California, San Francisco School of Medicine	Preceptor, FCM 198	Resident, Surgery, Stanford University	
2011 - 2011	Vona Britz-Diener	University of California, San Francisco School of Medicine	Preceptor, Physiology 198	Resident, Family Medicine, UC Davis	
2011 - 2012	Wendy Tseng	University of California, San Francisco School of Medicine	Research/Scholarly Mentor, Project Mentor	Resident, IM, OHSU	
2011 - 2012	Tina Yu	University of California, San Francisco School of Medicine	Project Mentor	UCSF, MSIV	

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Dates	Name	Program or School	Mentor Type	Role	Current Position
2011 - 2012	Jenny Cohen	University of California, San Francisco School of Medicine	Research/Scholarly Mentor, Career Mentor	Resident, IM, UCSF	Faculty
2011 - 2012	Edward Durant	University of California, San Francisco School of Medicine	Project Mentor	Stanford resident	
2011 - 2012	Tiffany Liu	University of California, San Francisco School of Medicine	Project Mentor	Harvard resident	
2011 - 2012	Nadia Gruber	University of California, San Francisco School of Medicine		UCSF, MS-3 MSTP student in Medicine and Anthropology	
2012 - 2013	Tanya Lagrimas	University of California, San Francisco School of Medicine	Preceptor, Public Health Elective (Epi 140.70)	UCSF/SFGH Family Medicine Resident	
2012 - 2013	Hugo Torres	University of California, San Francisco School of Medicine	Preceptor, Medical Ed. Elective (IDS 114)	UCSF, MSIV	

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Dates	Name	Program or School	Mentor Type	Role	Current Position
2012 - 2013	Cynthia So	University of California, San Francisco School of Medicine	Preceptor, International Health Elective	Harvard resident	
2012 - 2013	Polina Pulyanina	University of California, San Francisco School of Nursing	Informal mentor	UCSF, NSII	
2013 - 2014	Hannan Braun	University of California, San Francisco School of Medicine	Informal mentor	MD Candidate UCSF School of Medicine, Class of 2017	
2013 - 2014	Hannah Retallack	University of California, San Francisco School of Medicine	Informal mentor	MD Candidate UCSF School of Medicine, Class of 2017	
2014 - 2015	Dexter Louie	University of California, San Francisco School of Medicine	Project Mentor, Co-Mentor/Clinical Mentor	MD Candidate UCSF School of Medicine, Class of 2017	Resident, UCSF
2014 - 2015	Catherine Burke	University of California, San Francisco School of Medicine	Informal mentor	MD Candidate UCSF School of Medicine, Class of 2017	

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Dates	Name	Program or School	Mentor Type	Role	Current Position
2015 - 2016	Elizabeth Ginelli	University of California, San Francisco School of Medicine	Informal Mentor	MD Candidate UCSF School of Medicine, Class of 2019 Fellowship at Auschwitz for the Study Of Professional Ethics	
2015 - 2016	Allen Barnett	University of California, San Francisco School of Medicine	Mentor, AME curricular innovations project	MD Candidate UCSF School of Medicine, Class of 2019	
2015 - 2017	Nicolas Murphy	University of California, San Francisco School of Medicine	Research/Scholarly Mentor	MD Candidate UCSF School of Medicine, Class of 2019	
2018 -	Jeff Ondocsin	University of Texas	Research/Scholarly Mentor	MPH candidate	
2019	India Perez-Urbano	University of California, San Francisco School of Medicine	Summer curricular innovations project	MD Candidate, School of Medicine, 2022	
2019	Cara Eberhardt	University of California, San Francisco School of Medicine	Mentor: 4 th year Inquiry immersion project	MD Candidate, School of Medicine, 2020	

FACULTY MENTORING

Dates	Name	Position while Mentored	Mentor Type	Mentoring Role	Current Position
2004 - 2005	Elizabeth Wilson, MD, MPH	Assistant Professor	Co-Mentor/Clinical Mentor		Vice Chair, DFCM

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Dates	Name	Position while Mentored	Mentor Type	Mentoring Role	Current Position
2005 - 2006	Niranjan Karnik, MD, PhD	Resident, Psychiatry, Stanford; Assistant Professor, UCSF	Career Mentor		Vice Chair for Innovation Department of Psychiatry, Rusk University Medical Center, Chicago, IL
2007 - 2008	Ryan Brown, PhD	Fellow, RWJ Health and Society Postdoctoral Scholar			Faculty, Northwestern Univ.
2007 - 2011	Brad Shapiro, MD	Assistant Professor	Career Mentor		Professor, DFCM; Psychiatry, UCSF
2008 - 2017	George "Jay" Unick, PhD	Postdoctoral Fellow, Psychiatry	Research/Scholarly Mentor, Project Mentor, Career Mentor		Associate Professor, University of Maryland Medical Center
2009 - 2017	Daniel Rosenblum	Assistant Professor	Research/Scholarly Mentor		Associate Professor, Dalhousie University, Quebec
2011 - 2012	Jennifer Hettema, PhD	Assistant Professor	Co-Mentor/Clinical Mentor		Associate Professor, University of New Mexico
2011 - 2012	Shira Shavit	Assistant Professor	Co-Mentor/Clinical Mentor		Associate Professor
2012 - 2013	Dipesh R Bhakta, MD	Assistant Clinical Professor	Career Mentor		Assistant Clinical Professor, Family and Community Medicine

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Dates	Name	Position while Mentored	Mentor Type	Mentoring Role	Current Position
2014 - 2014	Heather Lee	Assistant Professor	K-award mentor		Assistant Professor, Family Medicine, Rutgers Univ.
2014 - 2014	Gaetan Haberkoss	Asst. Professor	Career Mentor		Assistant Clinical Professor, Family and Community Medicine
2015 - present	Sarah Mars	Analyst IV	Research/Scholarly Mentor, Project Mentor, Career Mentor		Associate Professional Researcher, Step 1
2015 - present	Magdalena Harris	Lecturer	Research/Scholarly Mentor, Career Mentor		Associate Professor, London School of Hygiene and Tropical Medicine
2016 - 2018	Jon E. Zibbell	CDC researcher	Research/Scholarly Mentor, Career Mentor		Faculty Center for the Study of Human Health Emory University
2017 - 2017	Aileen Kuscera,	Physician's Assistant at One Medical Group	Co-Mentor/Clinical Mentor		Applicant; doctoral programs in clinical psychology

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Dates	Name	Position while Mentored	Mentor Type	Mentoring Role	Current Position
2017 - present	Annick Borquez;	Postdoctoral researcher; division of Global Public Health UCSD	Research/Scholarly Mentor		Recipient, NIH/NIDA Avenir Award for Research on Substance Abuse and HIV/AIDS
2018 - 2019	Larissa Maier	Post-doctoral researcher, UCSF	Career mentoring		
2018 -	Will Brown	Post-doc, Center for AIDS Prevention, UCSF	Research/ Scholarly Mentor		Applicant, NIH/NIH K Award
2019 -	Christine Anastasiou, MD	UCSF Rheumatology Fellow	Research/ Scholarly Mentor		Post-doc UCSF

RESEARCH AND CREATIVE ACTIVITIES

RESEARCH AND CREATIVE ACTIVITIES SUMMARY

I have been Principal Investigator or Co-Investigator on numerous NIH sponsored research projects in the areas of public health and HIV/AIDS prevention. These population-based studies, utilizing both quantitative and qualitative methodologies, aim to deepen our understanding of HIV and related disease and risk-taking among socially marginalized groups, e.g., injection drug users. My work, including collaborations, has been published in New England Journal of Medicine, JAMA, Addiction, PLoS Medicine, International Journal of Drug Policy, Drug and Alcohol Dependency, American Journal of Public Health and other peer-reviewed journals.

With researchers at RAND, I have contributed to secondary analyses of the HIV Costs and Service Utilization Study (HCSUS) looking at disclosure of HIV status to sexual partners in a national sample of HIV seropositive persons. I was lead author on the first manuscript to come out of these analyses, published in the American Journal of Public Health. This paper is among the most cited of my work and received a sizable amount of national media attention including recently in the NYT (2012).

I have collaborated with Dr. Barbara Gerbert's team on their innovative "video doctor" computer-based intervention to reduce risk-taking among HIV-positive clinic patients. Results of the randomized controlled trial of this intervention are published in PLoS One. I am proud of my co-author and Co-Investigator contribution as the substance-use risk-reduction expert: among the most significant findings in this RCT is a reduction of overall drug use and

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specifically, methamphetamine use. This intervention has been listed by the Centers for Disease Control and Prevention as a "Best Evidence" HIV prevention program.

My contributions to the public health understanding of heroin use and consequences:

Collaborating with Dr. Philippe Bourgois, internationally renowned urban anthropologist, we developed an interdisciplinary research platform combining quantitative and qualitative techniques to explore structural risk and risk taking among injection drug users. Dr. Bourgois and I discovered that different physical and chemical types of heroin are prevalent in different regions of the US and that the behaviors associated with a certain type of heroin may have slowed the diffusion of HIV among IDUs. This working thesis has generated intrigue and controversy since its publication in 2003 (**Significant Publications #1 below; role: first author**). My K-23 grant (NIDA) enabled me to look more broadly at the medical consequences of differential heroin use. A commentary I wrote in 2005 on the political economy of global heroin was accepted for publication in the International Journal of Drug Policy (IJDP) as a lead editorial (**#2 below; role: first author**).

My recent Heroin Price, Purity and Outcomes study explored the medical consequences of distribution and use of the two main source-forms of heroin in the U.S. (Mexican-sourced "black tar" heroin and Colombian-sourced powder heroin). Foundational papers on the entry of novel Colombian-sourced heroin and its public health implications are in IJDP. (**#3 & 4; role: first author**) Recent publications stemming from this funding include a national epidemiological model demonstrating the rise in injection related soft tissue infections and their correlation with black tar heroin availability (**#5; first author**); and a detailed qualitative paper on users' perceptions of tar vs powder heroin (**#6; senior author**).

Doing street-based ethnographic research has an advantage of real time authentic observation. Fieldwork I did during 2011-12 in inner-city Philadelphia led to a big-shift in the focus of my teams' work. We documented the early rise of the US heroin epidemic and the influx of users migrating from opioid pill dependency to heroin. Our first papers on this received national attention all the way to the White House. These include a national statistical model on the intertwining epidemics of prescription opioid- and heroin-related overdose (**#7; senior author**); this paper, led by Dr. Jay Unick, has been cited 110 times and the language of "intertwined epidemics" used by many leaders including Michael Botticelli, former Director, ONDCP. Its Altmetric score of 433 puts it in the top 1 percentile of all research outputs measured. "Every never I ever said came true" is a qualitative exploration of opioid-pill to heroin transition stories (**#8; senior author**); this paper, led by Dr. Sarah Mars has received several accolades: cited 144 times, it is the **most cited paper at the International Journal of Drug Policy since 2011**; a "highly cited paper" according to Science Direct, it has received enough citations to place it in the top 1% of the academic field of Pharmacology & Toxicology; its Altmetric score of 29 puts it in the top 5th percentile of all research outputs.

I am currently leading the Heroin in Transition (HIT) study a five-year project with integrated multidisciplinary – ethnographic, economic and statistical modeling – aims to examine the recent rise in US heroin use and the expanding diversity of heroin source-forms and illicitly-made synthetic opioids (e.g. fentanyl) and their relationship to sharp increases in illicit opioid-involved morbidity and mortality. During the peer-review process for vetting this RO1 grant application we received a perfect score of "10;" an exceedingly rare occurrence in the competitive NIH funding world. Early publications include two IJDP commentaries: one on the role of heroin solution acidity as a proximal risk factor for disease (**#9; first author**); and a methodology commentary on how ethnographic contextualization of marginalized populations and "risk environments" can improve public health inferences (**#10; first author**). In 2017 I

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served as Guest Editor for a Special Issue of IJDP: "Heroin in Transition; Supply Changes, Fentanyl Adulteration and Consequences"; exploring the heroin adulteration crisis in the US; this issue contained ten original research papers, including two from the HIT study; and my editorial (# 11, 12; **first author**). The HIT papers and editorial have attached serious media attention (see below) and Altmetric scores placing them in the top 3%ile of all research outputs measured.

My work in understanding heroin use and consequences has garnered intense national attention. In 2015 I had a meeting at The Office of National Drug Control Policy (ONDCP) and in 2016 began serving as an expert consultant at the behest of the Centers for Disease Control and Prevention, Injury Prevention Branch. I was nominated to the Scientific Advisory Board for the latter by the HHS Secretary (pending). In 2016 I also shared a live webinar stage, with an international audience (~850) with Dr. Wilson Compton, Deputy Director at the National Institute on Drug Abuse; we discussed the evolving US heroin epidemic. In late 2016 I was invited to speak at the National Academies of Science and Medicine by a committee convened to work on advancing policies on addressing chronic pain management. In 2017 I have spoken on Capitol Hill to staff and representatives from the Neuroscience Caucus; thrice to forums run by the Association for the Advancement of Science; at the 10th annual National Opioid and Heroin Summit; and the Heroin Response Strategy Symposium organized by the CDC and ONDCP. In 2018 I testified before the Committee on Foreign Affairs, Subcommittee on Africa, Global Health, Global Human Rights, and International Organizations, United States House of Representatives at a hearing on "tackling fentanyl".

National media mentions for the HIT project (2017-18 alone) include (among 82 total): New York Times; 5 articles, three front page, one initiated by me and one co-constructed; New Yorker; 2 articles; Science (American Association for the Advancement of Science); 2 articles; Nature; Chicago Tribune; 2 articles; Mother Jones; 2 articles; Nature; Washington Post 2 articles; Glamour magazine; ABC Nightline (online); Bloomberg; San Francisco Magazine; Los Angeles Times; UCSF media as well as numerous radio and TV spots.

According to Mendeley (as of 8.3.20), the total body of my work has been cited 3216 times with an h-index of 29 (i.e., number of papers with that number of citations), 3998 readers and 64k views. My work has an international reputation as evidenced by the citation indices, my service to journals (five NEJM reviews), an Associate Editor position at IJDP, international presentations and invitations to participate in heroin related research in Europe and South America. My national reputation is evidenced by calls to service at the CDC, FDA, National Academies of Science and Medicine, and the American Association for the Advancement of Science as well as testimony to the US Congress.

RESEARCH AWARDS - CURRENT

1. RO1 DA037820	Principal Investigator	Ciccarone (PI)
NIH / NIDA	02/01/2015	01/31/2021
Heroin in Transition (HIT) Study	\$ 500,000 direct/yr	\$ 2.5M total
	1	
2. Supplement to above award	2/01/2019	01/31/2021
NIH / NIDA	\$100,000 direct	

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RESEARCH AWARDS - PAST

1. RO1 DA27599	Principal Investigator		Ciccarone (PI)
NIH / NIDA and NIAID		02/01/2010	01/31/2016
Heroin Price and Purity Outcomes Study (HPPOS)		\$ 250,000 direct/yr	\$ 1,250,000 total
		1	
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2. R01DA10164	Co-Investigator	15 % effort	Bourgois (PI)
NIH / NIDA		1996	2015
The Logics for HIV Risk Among Homeless Heroin Addicts		\$ 250,000 direct/yr	
		1	
Multiple competing renewals total			
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3. K23-DA16165	Principal Investigator		Ciccarone (PI)
NIH / NIDA		2004	2010
The Medical Consequences of Different Types of Heroin			\$ 832,000 total
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4. 2001 – 2002	Co-Investigator		Lum (PI)
SAMHSA		2008	2013
SBIRT Medical Residency Program at SFGH		\$ 375,000 direct/yr	\$ 1,875,000 total
		1	
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5.	Principal Investigator		Ciccarone (PI)
American Heart Association		2011	2011
Summer Student Project Grant			\$ 7,700 total
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6. RO1	Co-Investigator		Gerbert (PI)
2004 – 2010		2003	2008
Positive Choice: Clinic-based Prevention with HIV Positive Persons			
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7. PA-96-010	Project Director		Edlin (PI)
\$7,700 total		1998	2000
Medical and Health Consequences of Drug Abuse			

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I worked on this project as part of my post-doctoral fellowship

PEER REVIEWED PUBLICATIONS

1. Lurie P, Lowe RA, Avins AL, Phillips KA, Kahn JG, Franks PE, Ciccarone DH. Undiagnosed HIV infection in acute care hospitals. *N Engl J Med.* 1992 Dec 17; 327(25):1815-6. PMID: 1435939
2. Phillips KA, Lowe RA, Kahn JG, Lurie P, Avins AL, Ciccarone D. The cost-effectiveness of HIV testing of physicians and dentists in the United States. *JAMA.* 1994 Mar 16; 271(11):851-8. PMID: 8114240
3. Lurie P, Avins AL, Phillips KA, Kahn JG, Lowe RA, Ciccarone D. The cost-effectiveness of voluntary counseling and testing of hospital inpatients for HIV infection. *JAMA.* 1994 Dec 21; 272(23):1832-8. PMID: 7990217
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5. Bangsberg DR, Hecht FM, Clague H, Charlebois ED, Ciccarone D, Chesney M, Moss A. Provider assessment of adherence to HIV antiretroviral therapy. *J Acquir Immune Defic Syndr.* 2001 Apr 15; 26(5):435-42. PMID: 11391162
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7. Murphy EL, DeVita D, Liu H, Vittinghoff E, Leung P, Ciccarone DH, Edlin BR. Risk factors for skin and soft-tissue abscesses among injection drug users: a case-control study. *Clin Infect Dis.* 2001 Jul 1; 33(1):35-40. PMID: 11389492
8. Edlin BR, Seal KH, Lorvick J, Kral AH, Ciccarone DH, Moore LD, Lo B. Is it justifiable to withhold treatment for hepatitis C from illicit-drug users? *N Engl J Med.* 2001 Jul 19; 345(3):211-5. PMID: 11463019
9. Ciccarone D. With Both Eyes Open: Notes on a Disciplinary Dialogue between Ethnographic and Epidemiological Research among Injection Drug Users. *Int J Drug Policy.* 2003; 14(1):115-8.
10. Ciccarone DH, Kanouse DE, Collins RL, Miu A, Chen JL, Morton SC, Stall R. Sex without disclosure of positive HIV serostatus in a US probability sample of persons receiving medical care for HIV infection. *Am J Public Health.* 2003 Jun; 93(6):949-54. PMID: 12773361
11. Seal KH, Downing M, Kral AH, Singleton-Banks S, Hammond JP, Lorvick J, Ciccarone D, Edlin BR. Attitudes about prescribing take-home naloxone to injection drug users for the management of heroin overdose: a survey of street-recruited injectors in the San Francisco Bay Area. *J Urban Health.* 2003 Jun; 80(2):291-301. PMID: 12791805
12. Ciccarone D, Bourgois P. Explaining the geographical variation of HIV among injection drug users in the United States. *Subst Use Misuse.* 2003 Dec; 38(14):2049-63. PMID: 14677781

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13. Charlebois ED, Perdreau-Remington F, Kreiswirth B, Bangsberg DR, Ciccarone D, Diep BA, Ng VL, Chansky K, Edlin BR, Edlin B, Chambers HF. Origins of community strains of methicillin-resistant *Staphylococcus aureus*. *Clin Infect Dis*. 2004 Jul 1; 39(1):47-54. PMID: 15206052
14. Ciccarone D, Coffin P, Preer G. Integrating HIV risk reduction into the medical curriculum. *Med Educ*. 2004 Nov; 38(11):1197-8. PMID: 15507033
15. Schackman BR, Finkelstein R, Neukermans CP, Lewis L, Eldred L, Ciccarone D et al.. The cost of HIV medication adherence support interventions: Results of a cross-site evaluation. *AIDS Care*. 2005; 17(8):927-37.
16. Ciccarone D. The Political Economy of Heroin: Regional Markets, Practices and Consequences. *Int J Drug Policy*. 2005; 16(5):289-90.
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53. Ciccarone D "Caring for the Underserved during Your Medical Education...and Beyond (Panel Presentation)." Family Medicine Interest Group: "FMIG Celebrates Primary Care!" December 2, 2004.
54. Muller JH, Hill-Sakurai L, Ciccarone D, Satterfield JM "Developing a Curricular Theme in Sociocultural and Behavioral Sciences: The Experience of One Medical School." 31st Annual Predoctoral Education Conference, Society for Teachers of Family Medicine, Albuquerque, New Mexico, January 27-30, 2005.
55. Ciccarone D, Jain S, Bourgois P "Understanding the Complexities of Illicit Substance Use in the 'Real World': A 4th-year Medical Student Elective." Second Department of Family and Community Medicine Colloquium, UCSF, San Francisco, California, October, 6, 2005.
56. Ciccarone D "Understanding HIV-related Risk and Risk Taking among Injection Drug Users." UCSF Student AIDS Forum, San Francisco, California, October 8, 2005.
57. Danley D, Gilbert P, Ciccarone D, Bangsberg D, Clanon K, Thakar D, Viloria JA, Khan A, McPhee SJ, Herzig K, Gerbert B "Results of a Behavioral Risk Assessment Designed to Facilitate Patient-Centered and Transmission Prevention Counseling in HIV Care Settings." Bay Area Clinical Research Symposium, San Francisco, California, October 14, 2005.
58. Ciccarone D, Bourgois P "'Water Works:' Anthropological Perspectives on HIV Prevention among Homeless Heroin Addicts." Medicine Grand Rounds, San Francisco General Hospital, San Francisco, California, November 1, 2005.
59. Mannheimer S, Botsko M, Hirschhorn L, Dougherty J, Ciccarone D, et al "The CASE Adherence Index: A Novel Method for Measuring Adherence to Antiretroviral Therapy."

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2006 National Institutes of Mental Health / International Association Physicians for AIDS Care International Conference on HIV Treatment Adherence, Jersey City, New Jersey, March 8-10, 2006.

60. Ciccarone D "The Political Economy of Heroin: Regional Markets, Practices and Consequences (Panel Presentation - Beyond the Edge of the Law: Studying the Illicit Drug Trade)." Society for Applied Anthropology Annual Meeting, Vancouver, British Columbia, Canada, March 28-April 2, 2006.
61. Danley D, Gilbert P, Ciccarone D, Thakar D, Herzig K, Gerbert B "Augmenting Providers' Detection of Unprotected Sex and Other Risky Behaviors with a Multimedia Risk Assessment." Society of General Internal Medicine 29th Annual Meeting, Los Angeles, California, April 26-29, 2006.
62. Ciccarone D "Heroin in Brown, Black and White: Structural Factors and Medical Consequences." National Development and Research Institutes, June 14, 2006.
63. Danley D, Gilbert P, Gansky S, Ciccarone D, Bangsberg D, Gerbert B "Illicit Drug Use is Reduced Following a Video Doctor Intervention Designed for HIV Care Settings: A Randomized Controlled Trial." XVI International AIDS Conference, Toronto, Canada, August 13-18, 2006.
64. Gilbert P, Danley D, Herzig K, Thakar D, Ciccarone D, Gansky S, Gerbert B "Assessing Disclosure of Risky Behaviors in a 'Prevention with Positives' Intervention." 134th Annual Meeting of the American Public Health Association, Boston, Massachusetts, November 4-8, 2006.
65. Ciccarone D "Dope at Discount: Heroin Price and Purity in the United States." 6th National Harm Reduction Conference, Oakland, California, November 8-12, 2006.
66. Ciccarone D, Kraus A "Dope at Discount: Heroin Price and Purity in the U.S." Disability Evaluation and Consultation Unit, City and County of San Francisco Human Services Agency, San Francisco, California, December 20, 2006.
67. Ciccarone D, Gilbert P, Gansky S, Calderon S, Gerbert B "A Randomized, Interactive 'Video-Doctor' Intervention Reduces Substance Use, Including Methamphetamine, Among HIV Positive Persons in Care." 2nd National Conference on Methamphetamine, HIV, and Hepatitis: Science & Response 2007, Salt Lake City, Utah, February 1-3, 2007.
68. Ciccarone D, Kraus A, Unick GJ "Dope at Discount: Public Health Consequences of Historically Low-Cost and Pure Heroin in the United States, 1990-2004." 135th Annual Meeting of the American Public Health Association, Washington, D.C., November 3-7, 2007.
69. Gilbert P, Ciccarone D, Gansky S, Calderon S, Gerbert B "A Randomized, Interactive 'Video-Doctor' Intervention Reduces Substance Use, Including Methamphetamine, Among HIV Positive Persons in Care." 135th Annual Meeting of the American Public Health Association, Washington, D.C., November 3-7, 2007.
70. Mohlenhoff B, Ciccarone D, Bourgois P "Memory and Madness: Perceptions of a Unique Culture-Bound Disorder Involving Altered Mental States." UCSF Medical Education Day, San Francisco, California, January 10, 2007.
71. Mohlenhoff B, Ciccarone D, Bourgois P "Memory and Madness: Perceptions of an Unique Culture-Bound Disorder Involving Altered Mental States." Innovations in Family Medicine:

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Research, Education, Community, Clinical Care, UCSF, San Francisco, California, May 10, 2007.

72. Ciccarone D, Gilbert P, Gansky S, Calderon S, Gerbert B "A Randomized, Interactive 'Video-Doctor' Intervention Reduces Substance Use, Including Methamphetamine, Among HIV Positive Persons in Care." Innovations in Family Medicine: Research, Education, Community, Clinical Care, UCSF, San Francisco, California, May 10, 2007.
73. Ciccarone D, Gilbert P, Gansky S, Calderon S, Gerbert B, "A Randomized, Interactive 'Video Doctor' Intervention Reduces Substance Use, Including Methamphetamine, Among HIV Positive Persons in Care." 2nd National Conference on Methamphetamine, HIV and Hepatitis: Science & Response 2007, Salt Lake City, Utah, February 1-3 2007.
74. Ciccarone D, Kraus, Unick GJ "Dope at Discount: Public Health Consequences of Historically Low-Cost and Pure Heroin in the United States, 1990-2004." 135th Annual Meeting of the American Public Health Association, Washington, D.C., November 3-7, 2007.
75. Gilbert P, Ciccarone D, Gansky S, Calderon S, Gerbert B "A Randomized, Interactive 'Video Doctor' Intervention Reduces Substance Use, Including Methamphetamine, Among HIV Positive Persons in Care." 135th Meeting of the Annual American Public Health Association, Washington, D.C., November 3-7, 2007.
76. Ciccarone D, Bourgois P, Jain S "Understanding Substance Use in the 'Real World:' A 4th Year Medical Student Elective." Society for Teachers of Family Medicine 34th Annual Predoctoral Education Conference, Portland, OR, January 24-27, 2008.
77. Utley B, Hoffman A, Ciccarone D "Spontaneous Teamwork: Using Improv to Improve Communication." Working Group on Educational Affairs/Working Group on Student Affairs Regional AAMC Conference, Asilomar Conference Center, Pacific Grove, California, April 27-30, 2008.
78. Ciccarone D, Gilbert P, Gerbert B "Clinic-based "Video Doctor" Intervention Reduces Methamphetamine Use among HIV Positive Patients." 1st Global Conference on Methamphetamine, Prague, Czech Republic, Sept. 15-16, 2008. [Abstract accepted, but presentation withdrawn due to travel constraints]
79. Ciccarone D, "Heroin in Brown, Black and White: Geographic Risk Environments in the US Heroin Market." Invited to speak at a Major Session, Risk Environments and Drug Harms, at Harm Reduction and Human Rights - International Harm Reduction Association's 20th International Conference, Bangkok, Thailand, April 19-23, 2009.
80. Lum P, Ratanawongsa N, Jain S, Shapiro B, Ciccarone D, Hersh D, Hettema J. "A SBIRT Medical Residency Program at San Francisco General Hospital." SBIRT Grantee Conference 2009, Bethesda, MD, November 3-4, 2009.
81. Ciccarone D, Ratanawongsa N, Hettema J, Lum P. "Engaging Medical Students and Residents in Multidisciplinary Substance Use Disorders Curricula." Workshop, with three presentations, organized and presented at the American Society of Addiction Medicine, 41st Annual Medical Scientific Conference, San Francisco, CA, April 15-18, 2010.
82. Chen HC, Muller J, Azzam A, Ciccarone D, Chang A, Chou C, "Integrated Exercises: Practicing Clinical Skills, Clinical Reasoning, and the Application of Basic Science Knowledge in Standardized Patient Encounters." AAMC Western Group on Educational

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Affairs (WGEA) 2010 Annual Conference, Asilomar Conference Center, Pacific Grove, CA, April 25-27, 2010.

83. Chen HC, Muller J, Azzam A, Ciccarone D, Chang A, Chou C, "Integrated Exercises: Practicing Clinical Skills, Clinical Reasoning, and the Application of Basic Science Knowledge in Standardized Patient Encounters." UCSF Academy of Medical Educators, Education Day 2010, UCSF, San Francisco, CA, April 12, 2010.

84. Hettema JE, Ciccarone D, Ratanawongsa N, Jain S, Shapiro B, Hersh D, Rios LD, Lum PJ, "The Role of Confidence, Perceived Responsibility, and Perceived Barriers in the Development of a Novel Substance Use Curriculum for Medical Residents." AAMC Western Group on Educational Affairs (WGEA) 2010 Annual Conference, Asilomar Conference Center, Pacific Grove, CA, April 25-27, 2010.

85. Ciccarone D, Hettema JE, Ratanawongsa N, Jain S, Shapiro B, Hersh D, Rios LD, Lum PJ, "The Role of Confidence, Perceived Responsibility, and Perceived Barriers in the Development of a Novel Substance Use Curriculum for Medical Residents." UCSF Academy of Medical Educators, Education Day 2010, UCSF, San Francisco, CA, April 12, 2010.

86. Assam A, Ciccarone D, Chang A, McNamara M, Chou C, Muller J. Foundations of Patient Care "Integrated Exercises:" Using the TLC Resources Throughout a Longitudinal Course. Presented at the opening of the Teaching and Learning Center, UCSF, January 18, 2011.

87. Ciccarone D. "Rising Tides: The Remodeling of International Flows of Heroin," in Panel: "Influencing the War on Drugs: Studying the Illicit Drug Trade." Society for Applied Anthropology 71st Annual Meeting, Seattle, WA, March 29 - April 2, 2011.

88. Ciccarone D., Unick G.J., Rosenblum D. "Rising Tide: Trends in Heroin Price, Purity and Heroin Related Consequences in the US: 1990 - 2008." The International Harm Reduction Association 22nd International Conference, Beirut, Lebanon, April 3-7, 2011.

89. Ciccarone D. International Panel: "'How does National Drug Policy Affect Drug Treatment? The SF perspective." The International Harm Reduction Association 22nd International Conference, Beirut, Lebanon, April 3-7, 2011.

90. Ratanawongsa N, Manuel J, Ciccarone D, Hettema J, Shapiro B, Lum P. Enhancing Residents' Clinical Skills in Screening, Brief Intervention, and Referral to Treatment for Substance Use Disorders. UCSF Academy of Medical Educators, Education Day 2011, UCSF, San Francisco, CA, April 25, 2011.

91. Ratanawongsa N, Manuel J, Ciccarone D, Hettema J, Shapiro B, Jain S, Coffa D, Cangelosi C, Tulsky J, Hersh D, Lum P. Screening, Brief Intervention, and Referral to Treatment (SBIRT) for Substance Use Disorders among Resident Physicians: Curriculum Development and Preliminary Evaluation. AAMC Western Group on Educational Affairs (WGEA) 2011 Annual Conference, Stanford University School of Medicine, Palo Alto, CA, April 30 - May 3, 2011.

92. Ratanawongsa N, Manuel J, Ciccarone D, Hettema J, Shapiro B, Lum P. Enhancing Residents' Clinical Skills in Screening, Brief Intervention, and Referral to Treatment for Substance Use Disorders. Society of General Internal Medicine 34th Annual Meeting, Phoenix, AZ, May 4-7, 2011.

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93. Tseng W, Unick GJ, Rosenblum D, Ciccarone D. Trends in injection drug use-related infective endocarditis in the United States, 1993-2007. American Heart Association 2nd Annual Greater Bay Area Research Award Reception, San Francisco, CA, Oct. 6, 2011.
94. Tseng W, Unick GJ, Rosenblum D, Ciccarone D. Trends in injection drug use-related infective endocarditis in the United States, 1993-2007. American Public Health Association 139th Annual Meeting, Washington, DC, October 29- November 2, 2011.
95. Unick GJ, Rosenblum D, Tseng W, Ciccarone D. Trends in Opiate-Related Overdose Admissions in a Nationally Representative Sample of US Hospitals: 1993-2007. American Public Health Association 139th Annual Meeting, Washington, DC, October 29- November 2, 2011.
96. Hettema J, Ratanawongsa N, Manuel J, Ciccarone D, Lum P et al. The Empirical Development of Feedback in a SBIRT Curriculum. Association for Medical Education and Research in Substance Abuse (AMERSA), 35th National Conference, Arlington, VA, November 3-5, 2011.
97. Unick GJ, Rosenblum D, Tseng W, Ciccarone D. Trends In Opiate Overdose Related Hospital Admission In a Nationally Representative Sample. 2012 Annual Conference of the Society for Social Work and Research, Washington, DC, January 11-15, 2012.
98. Tseng W, Unick GJ, Rosenblum D, Ciccarone D. Trends in injection drug use-related infective endocarditis in the United States, 1993-2007. Department of Family and Community Medicine Colloquium, UCSF, SF, CA, March 23, 2012.
99. Ciccarone D, Yu T, Azzam A, Nye, H, Muller J, Chang A. The Medical Note Writing Workshop. Department of Family and Community Medicine Colloquium, UCSF, SF, CA, March 23, 2012.
100. Ciccarone D, Yu T, Azzam A, Nye H, Muller J, Chang A. The Medical Note Writing Workshop. AAMC Western Group on Educational Affairs (WGEA) 2012 Annual Conference, Asilomar, CA, March 31 - April 3, 2012.
101. Ciccarone D, Yu T, Azzam A, Nye H, Muller J, Chang A. The Medical Note Writing Workshop. UCSF Academy of Medical Educators, Education Day 2012, UCSF, SF, CA, April 27, 2012.
102. Hauer K, Chang A, Ciccarone D, Fitzhenry K, Azzam A, Muller J, Fulton T, Yukawa M. Competency Directors and Competency Coaches: Implementing a Longitudinal, Individualized Competency-based Curriculum. American Association of Medical Colleges Annual Meeting, San Francisco, CA, November 2-7, 2012
103. Ciccarone D, Mars S, Montero F, Karandinos G, Bourgois P. The Pill-studded Path: Heroin Initiation East and West, AMERSA 36th National Conference, Bethesda, MD Nov. 1-3, 2012
104. Unick GJ, Ciccarone D, Rosenblum D. National Demographic Trends in Hospitalizations for Heroin- and Opioid-Related Overdoses, 1993-2009, AMERSA 36th National Conference, Bethesda, MD Nov. 1-3, 2012 [Note: Finalist for Best Abstract]
105. Unick GJ, Ciccarone D, Rosenblum D. Intertwined Epidemics: Rising Hospitalizations for Heroin- and Opiate-Related Overdoses, 1993-2009. 9th National Harm Reduction Conference: From Public Health to Social Justice, Portland OR. Nov 15-18, 2012.

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106. Mars S, Ciccarone D, Montero F, Karandinos G, Bourgois P. The Pill-studded Path: Heroin Initiation East and West, 9th National Harm Reduction Conference: From Public Health to Social Justice, Portland OR. Nov 15-18, 2012.
107. Unick GJ, Ciccarone D, Rosenblum D. National Demographic Trends in Hospitalizations for Heroin- and Opioid-Related Overdoses, 1993-2009, Society for Social Work and Research 17th Annual Conference, San Diego, CA, Jan 16-20, 2013.
108. Rosenblum D, Unick J and Ciccarone D. The Entry of Colombian Heroin into the US Market: The Relationship between Competition, Price, and Purity. Seventh Annual Conference of the International Society for the Study of Drug Policy, to be held in Universidad de los Andes, Bogota, Colombia, May 15-17, 2013.
109. Ciccarone D, Harris, M. Shooting acid 'gear': The pH of street heroin in London, UK. Harm Reduction International Conference 2013, Vilnius, Lithuania, June 9-12, 2013
110. Bueno AM, Espinel Z, Schultz JM, Ciccarone D. Systematic Review of the Use of Buprenorphine for Opioid Withdrawal: Implications for Practice in Colombia. Colombian Congress of Psychiatry 2013, Hotel Las Americas, Cartagena, Colombia, October 10-14, 2013.
111. Unick GJ, Ciccarone D, Rosenblum D. Relationship between US Heroin Market Dynamics and Heroin-Related Overdose 1992-2008, 37th Annual AMERSA National Conference, Bethesda, MD, November 7-9, 2013.
112. Bourgois P, Ciccarone D, Rosenblum D, Castrillo FM, Mars S, Karandinos G, Unick GJ. "Puerto Rican Vulnerability in the US Inner-City Narco-Economy" presented to the Department of Socio-Medical Sciences, Mailman School of Public Health, Columbia University, January 27, 2014.
113. Ciccarone D, Rosenblum D, Castrillo FM, Bourgois P, Mars S, Karandinos G, Unick GJ. Urban Segregation and the US Heroin Market: A Quantitative Model of Anthropological Hypotheses from an Inner-City Drug Market. Society for Applied Anthropology 74th Annual Meeting, Albuquerque, NM, March 18-21, 2014.
114. Ciccarone D, Rosenblum D, Castrillo FM, Bourgois P, Mars S, Karandinos G, Unick GJ. Urban Segregation and the US Heroin Market: A Quantitative Model of Anthropological Hypotheses from an Inner-City Drug Market. Eighth Annual Conference of the International Society for the Study of Drug Policy, CNR - Rome, Italy, May 21-23, 2014.
115. Unick GJ, Rosenblum D, Ciccarone D. National Trends in Heroin-related Skin and Soft Tissue Infections and Relationships to Heroin Market Characteristics, 38th Annual AMERSA National Conference, San Francisco, CA, November 6-8, 2014.
116. Mars S, Montero F, Karandinos G, Bourgois P, Ciccarone D. Heroin Overdose: Explaining Contrasting Patterns on the East and West Coasts, 38th Annual AMERSA National Conference, San Francisco, CA, November 6-8, 2014.
117. Ciccarone D, Unick GJ, Rosenblum D. National Trends in Heroin-related Skin and Soft Tissue Infections and Relationships to Heroin Market Characteristics, 10th National Harm Reduction Conference, Baltimore, MD, Oct 23-26, 2014.
118. Mars S, Montero F, Karandinos G, Bourgois P, Ciccarone D. Heroin Overdose: Explaining Contrasting Patterns on the East and West Coasts, 10th National Harm Reduction Conference, Baltimore, MD, Oct 23-26, 2014.

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119. Ciccarone D. Fire in the Vein: Heroin Acidity, Vein Loss and Abscesses, 10th National Harm Reduction Conference, Baltimore, MD, Oct 23-26, 2014.
120. Unick GJ, Ciccarone D. National Trends in Heroin-Related Soft Tissue Infections and Their Relationship to Change in Local Heroin Markets, Society for Social Work and Research 19th Annual Conference: The Social and Behavioral Importance of Increased Longevity, Jan 2015
121. Ciccarone D. Fire in the Vein: Heroin Acidity, Vein Loss and Abscesses. Society for Applied Anthropology 75th Annual Meeting, Pittsburg, PA, March 24th - 28th 2015
122. Ciccarone D, Unick GJ. "The Pendulum and the Pit": Rising heroin-related medical consequences in the US, 2005-2012. Ninth Annual Conference of the International Society for the Study of Drug Policy, Gent, Belgium, May 20-2, 2015.
123. Ciccarone D, Unick GJ, Rosenblum D., National Trends in Heroin-related Skin and Soft Tissue Infections and Relationships to Heroin Market Characteristics, International Harm Reduction Conference, Malaysia, Nov. 2015
124. Mars S, Montero F, Karandinos G, Bourgois P, Ciccarone D. The Vicissitudes of Heroin: Change and Continuity in Heroin Forms and Markets in the United States, 39th Annual AMERSA National Conference, Washington, DC, November 7-9, 2015.
125. Ciccarone D, Unick GJ. Opioid "Push" Or Heroin "Pull": Regional Disparities in the Heroin Overdose Epidemic, 39th Annual AMERSA National Conference, Washington, DC, November 7-9, 2015.
126. Ciccarone D., Mars, S. Heroin Uncertainties: The Rise in New Forms of Heroin in the US. Society for Applied Anthropology 76th Annual Meeting, Vancouver, BC, Canada, March 29th -April 2nd 2016. [Session Chair and presenter]
127. Mars SG, Fessel JN, Ciccarone D. The Appreciation of Heroin: Connoisseurship and Its Absence in the Present Day United States. Society for Applied Anthropology 76th Annual Meeting, Vancouver, BC, Canada, March 29th -April 2nd 2016.
128. Unick GJ. Ciccarone D. Rates of Opioid Overdose Among Recipients of US Disability Insurance Payments, Tenth Annual Conference of the International Society for the Study of Drug Policy, Sydney, Australia, May 16-8th, 2016.
129. Ciccarone D, Unick GJ. Intertwined Epidemics: U.S. Regional Disparities in the Heroin and Opioid Overdose Epidemics. Tenth Annual Conference of the International Society for the Study of Drug Policy, Sydney, Australia, May 16-8th, 2016.
130. Yuan P, Goodman L, Nason P, Azzam A, Ciccarone D, Satterfield J. Calibrated Peer Review (CPR): A Peer-Peer Evaluation System to Enrich Learning. MedEd Day, UCSF, 2016
131. Rosenblum D, Unick GJ, Ciccarone D. An Instrumental Variables Approach to Estimating the Effects of Changes in the Heroin Market on Overdose in the US. Economics Department, Canadian Economics Association. June. 2016
132. Zibbel J, Ciccarone D, Wheeler E. Panel presentation: "Illicitly Manufactured Fentanyl in the United States: Implications for Overdose Prevention and Public Health" 11th National Harm Reduction Conference, San Diego, CA, November 3-6, 2016

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133. Ciccarone D, Unick GJ, Mars S. A More Dangerous "Heroin": emerging patterns in the heroin overdose epidemic, 11th National Harm Reduction Conference, San Diego, CA, Nov 3-6, 2016.
134. Mars S, Ciccarone D, Bourgois P. What is happening to heroin? Flux in the current US heroin market, 11th National Harm Reduction Conference, San Diego, CA, Nov 3-6, 2016.
135. Rosenblum D, Unick GJ, Ciccarone D. An Instrumental Variables Approach to Estimating the Effects of Changes in the Heroin Market on Overdose in the US. Economics Department, University of Adelaide. Nov. 2016
136. Unick GJ, Ciccarone D. Rates of Opioid Overdose Among Recipients of US Disability Insurance Payments, Society for Social Work and Research 21st Annual Conference: Jan 2017
137. Ciccarone D., Mars, S. Heroin Uncertainties: The Rise in New Forms of Heroin in the US. Society for Applied Anthropology 77th Annual Meeting, Santa Fe, NM, March 28th to April 1st 2017.
138. Ciccarone D. Heroin in Transition: Supply changes, adulteration and consequences. International Harm Reduction Conference, Montreal. May 14-17, 2017
139. Harris M; Ciccarone D; Hope V, Scott J. Drawing attention to neglected injecting-related harms: the case of AA amyloidosis International Harm Reduction Conference, Montreal May 14-17, 2017
140. Unick GJ, Ciccarone D. The US Regional Differences in Opioid vs. Heroin Overdose. Panel presentation at the Society for Epidemiologic Research's 50th Annual Meeting, Seattle, WA June 20-23rd 2017
141. Mars S, Ondocsin J, Fessel J, Ciccarone D. "It's Not Heroin Anymore!" Experiences Injecting Adulterated Heroin in Four East Coast States," 41st Annual AMERSA National Conference, Washington, DC, November 1-4, 2017.
142. Harris M, Braithwaite R, Wright T, Ciccarone D, Hope V, Scott J. Navigating the street injecting risk environment: learning from the experts to prevent health harms in the UK. International Harm Reduction Conference, Porto, Portugal, April 2019
143. Harris M, Braithwaite R, Wright T, Ciccarone D, Hope V, Scott J. Risky use of acidifiers in drug injection preparation: implications for health harms and service provision in the UK, International Harm Reduction Conference Porto, Portugal, April 2019
144. Ciccarone D, Ondocsin J, Howe M, Fessel J and Mars SG. Missed opportunities: viral transmission risks among a new cohort of injectors in the United States 'heroin' epidemic, 13th Annual Conference of the International Society for the Study of Drug Policy, Paris, France, May 2019
145. Rosenblum D, Ciccarone D. The Rapidly Changing US Illicit Opioid Market and the Potential for an Improved Early Warning System: Evidence from Ohio Drug Crime Labs. 13th Annual Conference of the International Society for the Study of Drug Policy, Paris, France, May 2019
146. Unick J, Rosenblum D, Ciccarone D. Drug Classification: Consequences for understanding the introduction of fentanyl. 13th Annual Conference of the International Society for the Study of Drug Policy, Paris, France, May 2019

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147. Bobashev G, OTHERS, Ciccarone D. NSDUH polysubstance use presentation. 13th Annual Conference of the International Society for the Study of Drug Policy, Paris, France, May 2019

OTHER CREATIVE ACTIVITIES

1. **TEACHING AND MENTORING CREATIVE ACTIVITIES:**
2. Ciccarone D and Bourgois P. Syllabus: Inflammation, Immunity and Infection Block, lecture on infectious complications of injection drug use. 2002, rev. 2003-2015. Awarded "Best Lecture" in 2009.
3. Ciccarone D and Pena-Dolhun E. Case: "Mr. D. Livery," Integration and Consolidation Block. 2003
4. Ciccarone D. Independent Learning Module: I-3 Block on "Socially" Transmitted Disease. 2003
5. Ciccarone D and Mittness L. Syllabus: Prologue Block, lecture on introduction to social sciences in medicine. 2003-2004.
6. Ciccarone D. Facilitator Guide: I-3 Block, small group exercise on social disparities in organ transplantation. 2003, rev. 2004, 2005.
7. Ciccarone D and Hogle L. Syllabus: I-3 Block, small group exercise on social disparities in organ transplantation. 2003, rev. 2004, 2005.
8. Ciccarone D and Dawson-Rose C. Syllabus: Inflammation, Immunity and Infection Block, small group exercise on HIV risk reduction. 2004.
9. Ciccarone D. Director. Recipient of UCSF Academy of Medical Educators Innovations funding. Syllabus: Understanding the Complexities of Substance Use in the "Real World," Fourth-year Medical School Elective. 2004-2008.
10. Satterfield J and Ciccarone D. Syllabus: Prologue Block Lecture, "The Biopsychosocial Model and Culture in Medicine: An Introduction to the Social and Behavioral Determinants of Health," Pages 7-11. 2005-2006.
11. Satterfield J and Ciccarone D. Script: Mr. Danovic's Outpatient Visit. 2005-present.
12. Ciccarone D. Case: "Leaving AMA: Medical Mistakes and Resistance to Medicine, or 'Please doc don't send me back'." Developed for and discussed in Critical Social Science Clinical Case Conference, Homeless Medicine Elective and Public Health and Homelessness: Intersections of Law and Health Care.
13. Ciccarone D and Abrahamson D. Case: "On the Edge: The Medical and Legal Case for Safer Injection Facilities." Developed for and discussed in: Public Health and Homelessness: Intersections of Law and Health Care. 2008, rev. 2009, 2010.
14. Ciccarone D. Editor, Syllabus, Foundations of Patient Care course during Organs Block (2009-present):
15. Ciccarone D. Editor, Syllabus, Transitional Clerkship (2009-present):

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16. Chen H.C. and Ciccarone D. Syllabus: "Challenging Communication," lecture during I3 Block. 2009-2011.
17. Foundations of Patient Care Co-Directors (including Ciccarone D.) Cases: revised cases used in PBLs and Integrated Exercises, including: "Daniel Green", "Henry Ponds" and "Rage."
18. Lum P., Ciccarone D., Ratanawongsa N., Jain S., Shapiro B., Ciccarone D., Hersh D., Hettema J. Curriculum development: "SBIRT (Screening, Brief Intervention and Referral to Treatment) Medical Residency Program at San Francisco General Hospital." This is a 7-week seminar series to introduce SBIRT skills to Internal Medicine residents. 2009-2015.
19. Shore W. and Ciccarone D. Syllabus: "The Medical Record, Part 1," and "The Medical Record, Part 2: The SOAP Note, during Organs Block. 2010
20. Shore WB, Ciccarone D (ed.) and Faculty of Foundations of Patient Care. Co-Edited: The Data Base: The Medical History, Physical Examination & Write-up. 7th Edition, 2010.
21.
 - o Ciccarone D. and Co-Directors of Foundations of Patient Care: Integrated Curriculum on Clinical Reasoning. I have integrated previously developed material and developed new material to make a longitudinal theme on clinical reasoning for the pre-clerkship students. The components of this curriculum (and my role):
 - o Lecture on the theory and practice of clinical problem solving. (I recruited for this lecture for the FPC block I direct.)
 - o Series of six "Integrated Exercises," one in each EC block, which allow students to practice information gathering and communication skills as well as exercise clinical reasoning by means of a worksheet. (Existing material; with extensive revisions to the Toby Ettinger case and exercise; see below)
 - o Clinical reasoning worksheets: these are utilized by students to develop an evolving differential diagnoses list after these key segments of the Integrated Exercise case: Chief Complaint, History of Present Illness, full History and Physical Exam. In addition students are asked to list key next questions at each stage. (I revised existing material.)
 - o The Master Clinician's Corner for Clinical Reasoning (MC3R): a series of six interactive sessions following each Integrated Exercise. These present the same case, or a parallel one, from the Integrated Exercise and have 1-2 expert clinical discussants walk the class through their reasoning process. It is interactive large group session with students using an audience response system to weigh in on their diagnoses as well as shorter clinical problems using the same clinical presentation as a stem for each question. (I conceived of the MC3R concept and format and led the conversion of each existing "Master Clinician Wrap-Up" lecture into the new format. I specifically directed and led the MC3R (and co-wrote the case) following the Toby Ettinger Integrated Exercise.)
 - o The Medical Note Writing Workshop emphasizes the reasoning process in the writing of medical notes (see below).
22. Ciccarone D. and Co-Directors of Foundations of Patient Care, Observed Structured Clinical Exam (OSCE):
23. Ciccarone D, Dhaliwal G and Daihk D. Master Clinician Wrap-up Case. Co-authored and co-presented the case of Irene G. Alperts, a fictional case of IGA nephropathy following URI. This case and interactive large format discussion diverges from the Toby Ettinger Integrated Exercise case, which I have edited and run since 2009. This case also includes script concordance tests, as aids in teaching clinical reasoning, and which I am pioneering use of in the medical school curriculum (see OSCE above). During 2011-2012, this case

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and discussion format has become the model for the wrap-up sessions for all the FPC Integrated Exercises (6 cases). During 2012-13, I revised this lecture and series to become "The Master Clinician's Corner for Clinical Reasoning (MC3R)." The series is well received by the students.

24. Ciccarone D and Tina Yu (MSII): The Medical Note Writing Workshop (2011). This is an active learning session, utilizing the technology of the Teaching and Learning Center, in which students hear and see a live SP interview and CV exam and practice writing H&P and SOAP notes with peer and facilitator guidance. Components developed for this:
25. Ciccarone D: The Medical Note Writing Workshop (2012). This is the second year of this workshop and a new case was adapted for use. The 2011 Workshop was well received by students and a description of it has been published in Really Good Stuff in the journal Medical Education. New teaching materials authored:
26. Satterfield J, Azzam A and Ciccarone D. John Danovic PBL Case for small group discussion in Brain Mind and Behavior block: "Cog Heuristics and Clinical Decision Making"
27. Ciccarone, Grundling and Lee-Atkinson. Medical Note Writing Workshop revision for Bridges (2016) New SP case with two parts; revised Facilitator Guide; model H&P and SOAP notes.
28. Oral case presentations video library. AME innovations grant (2016)
29. Michael Tomlin case. Developed for Bridges and the Clinical Microsystems Clerkship to be used in the Medical Note Writing Workshop (MNWS; sixth year). This is a Standardized Patient case in 2 parts: an initial visit for a patient presenting with uncontrolled asthma and a follow-up visit to establish primary care. Both SP encounters were videotaped and included a master clinician history and physical exam. These videos are presented to students in the MNWS for them to work on their first H&P and SOAP notes.
30. UC-wide Opioid Curriculum Working Group. This group, made up of senior educators representing each of the UC medical campuses, is charged with developing a contemporary curriculum on pain management and substance use disorder treatment. Output from 2018-19: 1. Education competencies on pain management and opioid use disorder across three domains. 2. Exploration of and advocacy on buprenorphine waiver training for all UC medical students (this is the project I have championed).

Exhibit B

Daniel Ciccarone Reliance List

In addition to the materials referenced in my report, I considered the following:

1. Cases of HIV confirmed in Cabell County,
<https://www.youtube.com/watch?v=nWJg273TNpU>
2. Epidemiology and Prevention of HIV and Viral Hepatitis Co-infections, Centers for Disease Control and Prevention, <https://www.cdc.gov/hepatitis/populations/hiv.htm>
3. West Virginia Department of Health and Human Resources, Heroin Fast Stats, West Virginia Department of Health and Human Resources
4. HepVu, Local Data: West Virginia, <https://hepvu.org/state/west-virginia/>
5. Susan Williams Keeshin and Judith Feinberg, Endocarditis as a Marker for New Epidemics of Injection Drug Use, Am J Med Sci. 2016 Dec; 352(6): 609–614
6. Inside America's Hepatitis Epidemic,
<https://www.youtube.com/watch?v=4mFZxnr7YQE>
7. West Virginia Department of Health & Human Resources, 2016 West Virginia Overdose Fatality Analysis: Healthcare Systems Utilization, Risk Factors, and Opportunities for Intervention
8. Letter from Charles Babcock et al., Bringing naloxone to ground zero: Huntington, West Virginia, Journal of the American Pharmacists Association 57 (2017) S8-S11
9. National Survey of Substance Abuse Treatment Services (N-SSATS), 2017 State Profile — West Virginia
10. West Virginia Department of Health & Human Resources, Outbreak Report: Opioid-Related Overdose – Huntington, West Virginia (August 2016)
11. West Virginia Board of Pharmacy, Prescription Opioid Problematic Prescribing Indicators County Report – Cabell County
12. Paul III, D. P., Botre, N., Phillips, M., Abboud, J., Coustasse, A. The Continuing Epidemic of Hepatitis C in the United States: The Case of West Virginia. Proceedings of the Northeast Business & Economics Association 2018 Conference (pp. 230-236). Galloway, NJ.
13. Sean T. Allen, DrPH, MPH, Allison O'Rourke, MPH, Rebecca Hamilton White, MPH, Kristin E. Schneider, BA, Michael Kilkenny, MD, and Susan G. Sherman, PhD, MPH, Estimating the Number of People Who Inject Drugs in A Rural County in Appalachia, Am J Public Health. 2019;109:445–450. doi:10.2105/AJPH.2018.304873
14. Bishop Nash, *DHHR says Cabell HIV cluster is growing*, Charleston Gazette-Mail, https://www.wvgazettemail.com/news/health/dhhr-says-cabell-hiv-cluster-is-growing/article_ba37b709-32ec-5b16-8b8c32867037b9b1.html
15. West Virginia Department of Health & Human Resources, West Virginia Health Advisory Number WV162-10-09-2019 (Human Immunodeficiency Virus (HIV) Infections Among People Who Inject Drugs – Additional Area Seeing Increase, Others Vulnerable)
16. AIDSVu, Local Data: West Virginia, <https://aidsvu.org/local-data/united-states/south/west-virginia/>
17. West Virginia Opioid Epidemic, Opioid & Health Indicators Database, <https://opioid.amfar.org/WV>

18. West Virginia Department of Health & Human Resources, Human Immunodeficiency Virus (HIV) and Acquired Immune Deficiency Syndrome (AIDS),
<https://oeprs.wv.gov/hiv-aids/Pages/default.aspx>
19. Sean T. Allen, Rebecca Hamilton White, Allison O'Rourke, N. Jia Ahmad, Tim Hazelett, Michael E. Kilkenny, Susan G. Sherman, Correlates of Transactional Sex Among a Rural Population of People Who Inject Drugs, *AIDS and Behavior* (2020) 24:775–781,
<https://doi.org/10.1007/s10461-019-02612-7>
20. Rebecca Hamilton White, Allison O'Rourke, Ricky N. Bluthenthal, Alex H. Kral,
21. Michael E. Kilkenny, Tim D. Hazelett, Susan G. Sherman & Sean T. Allen (2020) Initiating Persons into Injection Drug Use in Rural West Virginia, USA, *Substance Use & Misuse*, 55:2, 337-344, DOI:10.1080/10826084.2019.1669660
22. Kristin E. Schneider et al., Polysubstance use in rural West Virginia: Associations between latent classes of drug use, overdose, and take-home naloxone, *International Journal of Drug Policy* 76 (2020) 102642
23. West Virginia Department of Health & Human Resources, Hepatitis B and Hepatitis C Infection in West Virginia – 2016 Surveillance Summary (April 2018)
24. Bowden, N, Merino, R., Katamneni, S., Coustasse, A. (2018, April). The cost of the opioid epidemic in West Virginia. Paper presented at the 54th Annual MBAA Conference, Chicago, IL
25. The Opioid Files, The Washington Post,
<https://www.washingtonpost.com/national/2019/07/20/opioid-files/?arc404=true>
26. West Virginia Department of Health & Human Resources, West Virginia Health Advisory Number WV162-10-09-2019 (Human Immunodeficiency Virus (HIV) Infections Among People Who Inject Drugs – Additional Area Seeing Increase, Others Vulnerable)
27. HUNT_00030096
28. HUNT_00030290
29. HUNT_00030421
30. HUNT_00053205
31. HUNT_00060305
32. HUNT_00063582
33. HUNT_00081484
34. HUNT_00099227
35. HUNT_00028762
36. HUNT_00030411
37. HUNT_00074829
38. HUNT_00078524
39. HUNT_00080816
40. HUNT_00102403